"PROJECT NOPI"

James R. Bailey
Henry L. Smith
Elmer A. McCallum
and
William M. Place

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"PROJECT NOPI"

JAMES R. BAILEY
HENRY L. SMITH
ELMER A. McCALLUM
and
WILLIAM M. PLACE

Thesis
B139

INTRODUCTION

TITLE: "PROJECT NOPI"

PREPARED BY: LCdr. James R. Bailey, USNR.....Part I
Lt. Henry L. Smith, USN.....Part II
Lt. Elmer A. McCallum, USN.....Part III
Lt. William M. Place, USN.....Part IV

PURPOSE: [1956]

General - (a) To analyze the Production Planning and Control Function at the Naval Ordnance Plant, Indianapolis, Indiana (NOPI).

(b) To partially fulfill the Non-Thesis requirements for a Masters Degree in Industrial Engineering from Purdue University.

Part I - To summarize, for the purpose of analysis, the production planning and control function of NOPI, and to analyze this function for the purpose of procedures improvement.

Part II - To analyze the preparation of process routings, the control of manufacturing methods (standards), and the estimation of manufacturing times. To describe the preparation and functions of Engineering information used in the planning, scheduling, material procurement, and manufacturing procedures.

Part III - To investigate the information necessary for production scheduling, and to determine how this information is used in order to perform the scheduling function.

Part IV - To analyze the material and progress control functions within the Industrial Department and the relationship of this performance with the corresponding functions of the Supply Department

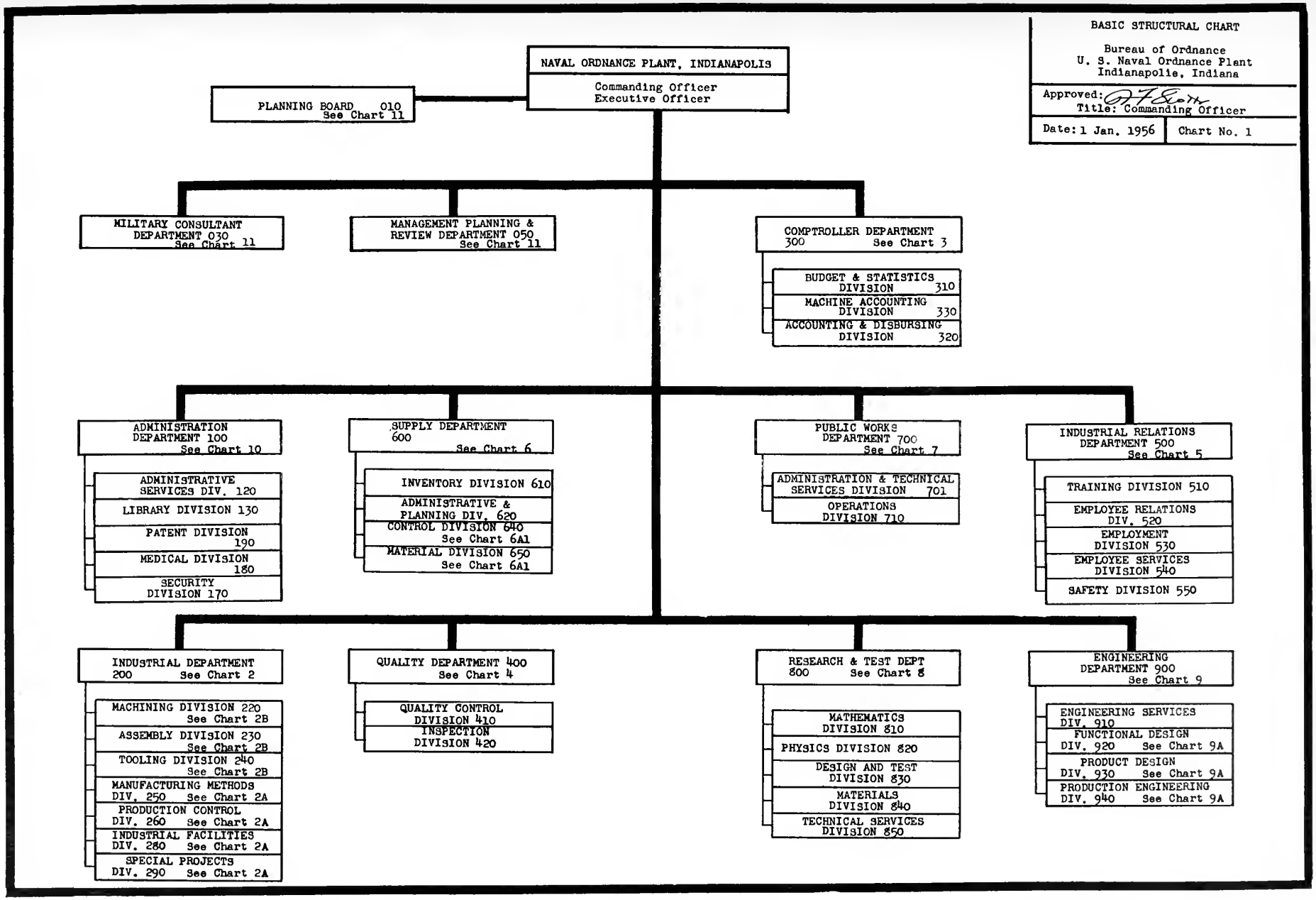
PROCEDURES:

General: The basic method of procedure was to identify the information which flows between the various organizational segments involved in the function of planning and controlling production, and the determination of the action taken upon receipt of this information. Emphasis was placed on the information rather than the form used to transmit this information.

Part I: This portion of the project deals primarily with the information which flows between Departments and between NOPI and external activities. Analysis Sheets No. 1 and No. 2 were prepared to indicate this flow of information. The items of information were listed in the approximate sequence and the columns arranged to indicate flow to or from any department by an arrow pointed up or down in the appropriate column. This procedure can be expanded to include any number of items of information and each line serves as a complete flow chart. Additional information may be included to indicate the action performed in each department but in this case Charts I-1 through I-6 are utilized to indicate the action in the departments and the relationship between various items of information.

ORGANIZATION CHARTS: Certain applicable structural and functional organization charts are included, following the Introduction, for reference.

FORMS: Certain "key" forms have been included for reference with appropriate sections of the report.

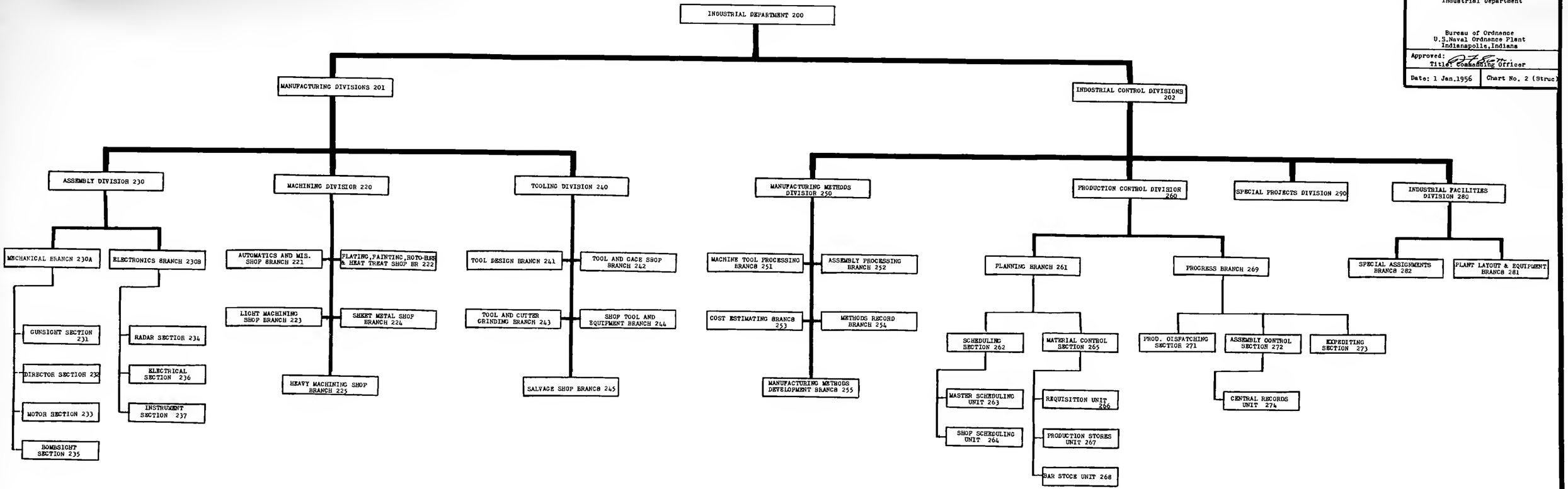

BASIC STRUCTURAL CHART
Bureau of Ordnance
U. S. Naval Ordnance Plant
Indianapolis, Indiana
Approved: O. J. Elliott
Title: Commanding Officer
Date: 1 Jan. 1956
Chart No. 1
NAVAL ORDNANCE PLANT, INDIANAPOLIS
Commanding Officer
Executive Officer
PLANNING BOARD 010
See Chart 11
MILITARY CONSULTANT DEPARTMENT 030
See Chart 11
MANAGEMENT PLANNING & REVIEW DEPARTMENT 050
See Chart 11
COMPTROLLER DEPARTMENT 300
See Chart 3
BUDGET & STATISTICS DIVISION 310
MACHINE ACCOUNTING DIVISION 330
ACCOUNTING & DISBURSING DIVISION 320
ADMINISTRATION DEPARTMENT 100
See Chart 10
ADMINISTRATIVE SERVICES DIV. 120
LIBRARY DIVISION 130
PATENT DIVISION 190
MEDICAL DIVISION 180
SECURITY DIVISION 170
SUPPLY DEPARTMENT 600
See Chart 6
INVENTORY DIVISION 610
ADMINISTRATIVE & PLANNING DIV. 620
CONTROL DIVISION 640
See Chart 6A1
MATERIAL DIVISION 650
See Chart 6A1
PUBLIC WORKS DEPARTMENT 700
See Chart 7
ADMINISTRATION & TECHNICAL SERVICES DIVISION 701
OPERATIONS DIVISION 710
INDUSTRIAL RELATIONS DEPARTMENT 500
See Chart 5
TRAINING DIVISION 510
EMPLOYEE RELATIONS DIV. 520
EMPLOYMENT DIVISION 530
EMPLOYEE SERVICES DIVISION 540
SAFETY DIVISION 550
INDUSTRIAL DEPARTMENT 200
See Chart 2
MACHINING DIVISION 220
See Chart 2B
ASSEMBLY DIVISION 230
See Chart 2B
TOOLING DIVISION 240
See Chart 2B
MANUFACTURING METHODS DIV. 250
See Chart 2A
PRODUCTION CONTROL DIV. 260
See Chart 2A
INDUSTRIAL FACILITIES DIV. 280
See Chart 2A
SPECIAL PROJECTS DIV. 290
See Chart 2A
QUALITY DEPARTMENT 400
See Chart 4
QUALITY CONTROL DIVISION 410
INSPECTION DIVISION 420
RESEARCH & TEST DEPT 800
See Chart 8
MATHEMATICS DIVISION 810
PHYSICS DIVISION 820
DESIGN AND TEST DIVISION 830
MATERIALS DIVISION 840
TECHNICAL SERVICES DIVISION 850
ENGINEERING DEPARTMENT 900
See Chart 9
ENGINEERING SERVICES DIV. 910
FUNCTIONAL DESIGN DIV. 920
See Chart 9A
PRODUCT DESIGN DIV. 930
See Chart 9A
PRODUCTION ENGINEERING DIV. 940
See Chart 9A

STRUCTURAL CHART
of the
Industrial Department

Bureau of Ordnance
U.S.Naval Ordnance Plant
Indianapolis,Indiana

Approved:
Title: Commanding Officer

Date: 1 Jan.1956 | Chart No. 2 (Struc)



FUNCTIONAL CHART
of the
Industrial Department

Bureau of Ordnance
U.S.Naval Ordnance Plant
Indianapolis, Indiana

Approved: O.F. Scott. CAPT USN.
Title: Commanding Officer

Date: 1 Jan. 1956

Chart No. 2 (F)

INDUSTRIAL DEPARTMENT D/200

Responsible for the formulation of policies, manufacture and overall direction of the Industrial Department in the assembly, calibration, testing, overhaul and alteration of airborne fire control equipment. Counsels with, and assists, other department heads in coordinating station policies and operating procedures. Acts in an advisory capacity to the Commanding Officer on matters of manufacturing and station administrative problems. Exercises direct supervision over the Heads of the Manufacturing and Industrial Control Divisions.

MANUFACTURING DIVISIONS D/201

Responsible for the formulation of operating procedures, policies and general direction of the production facilities of this station which are engaged in the manufacture, overhaul, modification and alteration of airborne fire control equipment. This includes tool design and build, manufacture of parts and components from raw stock, assembly and calibration of fire control and SA test equipment and the salveging and reclamation of components rejected in manufacture.

SEE CHART 2B(F)

INDUSTRIAL CONTROL DIVISIONS D/202

Responsible for the formulation of operating procedures, policies and general direction of the Industrial Control Divisions, who plan for and control all manufacturing. This includes determination of whether parts or components shall be purchased or manufactured locally, ordering of raw materials, purchased components and tools. Development of specific manufacturing instructions and production schedules, maintenance of workload charts, reporting on production progress, development of plant layouts for production facilities and coordination of special assignments as assigned by the Head of the Industrial Department.

SEE CHART 2A(F)

FUNCTIONAL CHART
of the
Industrial Control Divisions
Industrial Department

Bureau of Ordnance
U. S. Naval Ordnance Plant
Indianapolis, Indiana

Approved:
Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 2A (F)

MANUFACTURING METHODS DIVISION 25D

Directs the operation of the Manufacturing Methods Division. Provides technical advice to various departments on manufacturing, design, and development problems in connection with production. Initiates programs to increase production through improved methods. Evaluates Beneficial Suggestions effecting production. Reviews plant layouts for the Industrial Department, and recommends procurement of additional facilities. Maintains contacts with outside suppliers regarding technical manufacturing problems and makes recommendations to the Supply Officer as to sources of procurement.

MACHINE TOOL PROCESSING BRANCH 251

Prepares and maintains process routings for the manufacture of all machine parts using existing facilities. Orders all tools and test equipment for production of machine parts. Provides technical advice to other divisions of the Industrial Department. Responsible for the development of material handling procedures and equipment. Orders and directs maintenance on pattern and moulding equipment for all production parts

ASSEMBLY PROCESSING BRANCH 252

Prepares and maintains assembly process routings outlining method of assembly, calibration, and tests of mechanical and electrical fire control equipment. Furnishes technical advice to the manufacturing shops. Orders all tools and test equipment for assembly of end shipping item. Assists the Development Branch in the manufacture of preproduction units for evaluating routings.

COST ESTIMATING BRANCH 253

Responsible for the preparation of cost estimates and proposals, establishes standard time on process routings, records and directs stowage of all SA tools, castings, forgings, and molding equipment. Records and maintains a file of previous costs of manufacture and/or purchased material.

MANUFACTURING METHODS DEVELOPMENT BRANCH 255

Responsible for the manufacture of preproduction pilot models to prove and/or improve manufacturing process routings. Evaluates tooling and test equipment. Provides liaison between the Manufacturing Methods Division and the Engineering Department regarding engineering changes and/or design changes to facilitate manufacturing.

METHODS RECORD BRANCH 254

Receives, records, stores and redistributes all engineering data received by the Industrial Department for manufacturing purposes. Develops routing folders, assigns and records shop accessory numbers to tool orders and disposes of obsolete technical material within the Industrial Department. Responsible for the handling and recording of all classified data released to the manufacturing shops.

PRODUCTION CONTROL DIVISION 260

Coordinates the activity of the Planning and Progress Branches. Provides counsel concerning the station's future workload. Follows the progress of high priority jobs. Recommends the additional use of overtime, where needed. Maintains liaison with BuOrd personnel concerning current production problems effecting delivery.

PLANNING BRANCH 261

Coordinates Scheduling and Material Control Section activities. Assists in the formulation of policy concerning plant ability to absorb load. Recommends future action to be taken, increasing or decreasing direct labor complement. Advises type of work required to maintain plant load. Handles special assignments concerning the need for production statistics not normally available.

SCHEDULING SECTION 262

Coordinates the Master Scheduling and Shop Scheduling activity. Provides statistical information concerning these functions not prepared in a routine manner. Establishes policy to meet current scheduling needs of manufacturing divisions.

MASTER SCHEDULING UNIT 263

Provides master scheduling on an overall, long range basis at the project order level. Determines where new project orders may fit into the overall schedule. Develops production charts and progress reports.

SHOP SCHEDULING UNIT 264

Provides detailed completion dates for each part, sub-assembly and major assembly to be produced as outlined by master schedule. Maintains statistics concerning number of man hours loaded, material available for production and performance data. Maintains manload information by shop section for Machining Division and overall load for Tooling and Assembly Divisions. Issues all shop orders and provides comparison of estimate and actual cost of each shop order completed for control purposes.

MATERIAL CONTROL SECTION 265

Coordinates the activity of the Production Stores and Requisition Units. Aids in the formulation of policy concerning the handling of engineering releases and the processing of material requisitions with relation to accounting requirements. Establishes priority in the processing of Job Orders.

REQUISITION UNIT 266

Determines, with the assistance of the Manufacturing Methods Division, which parts, assemblies or components shall be purchased or manufactured locally. Screens available stocks in the Supply System and issues stub requisitions for required materials to meet production delivery dates.

PRODUCTION STORES UNIT 267

Maintains stores of finished parts and components thereof in process of manufacture until accumulations are available for assembly of finished product.

BAR STOCK UNIT 268

Stores work in process for the Machining Division and raw materials waiting to be placed in process of manufacture.

PROGRESS BRANCH 269

Coordinates the activities of the Production Dispatching, Assembly Control and Expediting Sections. Assists in the breaking of production bottlenecks occurring in these sections. Provides periodic reports on the progress of each Job Order.

PRODUCTION DISPATCHING SECTION 271

Controls the issue of shop orders to the Machining, Assembly and Tooling Divisions within established production schedules. Maintains current progress information on each shop order. Acts as liaison between shop and other Industrial Control personnel.

ASSEMBLY CONTROL SECTION 272

Maintains follow-up on Assembly schedule, acts as liaison between Assembly supervisor and Project Expeditor on all matters of supply. Determines responsibility for material shortages occurring in Assembly. Initiates replacement action for scrap and loss when appropriate.

CENTRAL RECORDS UNIT 274

Maintains record of availability and source of each part and sub-assembly. Requisitions from stock, and follow-ups on flow of materials for Assembly.

EXPEDITING SECTION 273

Maintains receipt, disbursement, source and part status records, in detail, for all production (Industrial Department cognizant) job orders; also initiates shortage lists for Project Expeditors follow-up. All historical data concerning part and sub-assemblies collected by this unit.

SPECIAL PROJECTS DIVISION 290

Directs, coordinates and expedites special projects which require out-of-routine handling; provides technical liaison between the Industrial Department and other departments and private industrial organizations regarding special projects or assignments; provides technical advisory assistance to other organizational segments upon request.

INDUSTRIAL FACILITIES DIVISION 280

Directs the operation of the Industrial Facilities Division. Maintains contact with the Bureau of Ordnance Machine Tool and Industrial Facilities Section for procurement of machines and other plant facilities. Contacts representatives of the machine tool industry regarding latest developments. Assists other departments with Industrial Engineering problems. Executes special assignments not within the scope of any other functional group of the Industrial Department.

SPECIAL ASSIGNMENTS BRANCH 282

Studies and reports on unusual problems not within the scope of any other functional group in the Industrial Department. Provides technical advice and services of an Industrial Engineering nature. Designs and develops special equipment not commercially available. Analyzes facility requirements, arranges for funds, prepares annual Capital Equipment Requirements Budget and maintains expenditure record of allotted funds. Coordinates the preparation of Industrial Department Bulletins and Instructions.

PLANT LAYOUT & EQUIPMENT BRANCH 281

Develops Industrial Department plant layout arrangements of production equipment and plant facilities to insure the efficient flow of materials through manufacturing. Initiates action to procure, alter, repair and dispose of machine tools and other plant equipment. Maintains control of plant property inventory. Inspects and evaluates performance of new production equipment. Assists other departments in developing layouts. Acts as liaison between Industrial and Public Works Department. Prepares a description for all Plant Property Account Equipment (Class 7) record cards and tags this equipment with the Navy identification number.

CHART NO. 2A(F)

FUNCTIONAL CHART
of the
Production Divisions
Industrial Department

Bureau of Ordnance
U.S. Naval Ordnance Plant
Indianapolis, Indiana

Approved: [signature]
Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 2 B (P)

ASSEMBLY DIVISION 230

Directs and coordinates the various activities of the Assembly Division including assembly, overhaul and test of electronic and mechanical fire control equipments. Acts as a consultant on assembly techniques and problems.

MECHANICAL BRANCH 230

Directs and coordinates the activities of the four sections of the Mechanical Branch in the assembly of gunsights, bombsights, directors and motors.

GUNSIGHT SECTION 231

Assembles, repairs and modifies air and shipborne gunsights and sight systems. Assemblies include mechanical, electrical and optical parts. Performs functional tests and calibration of gunsights and sight systems in accordance with ordnance and engineering specifications. Assembles, repairs and modifies test equipment used by the various services for test and calibration of fire control instruments in the field.

DIRECTOR SECTION 232

Assembles all types of precision parts of a highly complex nature. Assemblies include mechanical and electrical parts used in fire control instruments, test devices and relative equipment. Performs functional tests and calibration of mechanical fire control instruments in accordance with ordnance and engineering specifications.

MOTOR SECTION 233

Assembles, repairs and modifies all types of motors and synchronous instruments used in fire control mechanisms. Assembles electrical and mechanical sub-assemblies and components for replacements in the field on fire control mechanisms.

BOMBSIGHT SECTION 235

Assembles, repairs and modifies airborne fire control instruments and systems. Assembles include mechanical, electrical and optical parts. Performs functional tests and calibration of fire control instruments in accordance with ordnance and engineering specifications.

ELECTRONICS BRANCH 230

Directs and coordinates the activities of three sections of the Electronics Branch in the assembly of electronic fire control instruments.

RADAR SECTION 234

Assembles and repairs components for radar and complete fire control systems. Performs functional tests and calibration of electronic fire control instruments in accordance with ordnance and engineering specifications.

ELECTRICAL SECTION 236

Assembles and tests intricate electrical parts and components for complex electronic fire control systems. Manufactures transformers, toroidal coils, cables, special resistors and wire harnesses used in electronic fire control equipment.

INSTRUMENT SECTION 237

Assembles, repairs and modifies all S.A. electronic test equipment used for performing functional tests and calibration of fire control instruments. Repairs and overhauls all electronic measuring and testing instruments.

MACHINING DIVISION 220

Directs and coordinates the various activities of the Machining Division including metal turning, fabricating, finishing and metal treatment techniques. Acts as a consultant on special production processes.

AUTOMATICS AND MISCELLANEOUS SHOP BRANCH 221

Fabricates precision parts on various types of American and Swiss automatic screw machines for use in fire control instruments. Utilizes other standard machine tools for second operations.

PLATING, PAINTING, ROTO-BURRING AND HEAT TREAT SHOP BRANCH 222

Directs the activities of the plating, painting, roto-burring and heat treat shops. Processes include metal finishing, heat treating, painting and the preparation of various materials for the prevention of fungus growths.

LIGHT MACHINING SHOP BRANCH 223

Fabricates precision gears, worms and parts of complicated design for use in fire control instruments and related equipment.

SHEET METAL SHOP BRANCH 224

Fabricates precision sheet metal assemblies used on fire control equipment. Assemblies include cases, chassis and wave guides. Processes include gas, electric and heli-arc welding, soldering (soft and silver), punching, shearing, drawing and machining of all types of sheet metal. Other operations include fabrication of components using wire, plastics, rubber, cork, and paper gasket material.

HEAVY MACHINING SHOP BRANCH 225

Machines to precision tolerances complex castings and experimental parts used in fire control instruments and related equipment.

TOOLING DIVISION 240

Directs and coordinates the various activities of the Tooling Division including tool and gage design, tool and gage manufacture, tool and cutter grinding, tool and equipment control and salvage of defective production material. Controls procurement, inventory, issuance, maintenance, alterations and obsolescence of accessories, small plant facilities and standard tools. Acts as consultant on all tool and gage problems, with the authority to determine whether tools shall be procured or station manufactured. Responsible for screening Methods' tool requirements and recommends simplification of manufacturing routings.

TOOL DESIGN BRANCH 241

Conceives and designs special tools, dies, fixtures, gages, machine tool accessories, and small plant facilities.

TOOL AND GAGE SHOP BRANCH 242

Fabricates, modifies, and maintains special tools, dies, fixtures, gages, machine tool accessories and small plant facilities. Fabricates and assembles special mechanical test equipment.

TOOL AND CUTTER GRINDING BRANCH 243

Fabricates and reconditions special perishable tooling. Perpetually regrinds and resharpens standard perishable tooling.

SHOP TOOL AND EQUIPMENT BRANCH 244

Establishes quantity levels, specifications for procurement and requests procurements, maintains inventory control and issues standard tools and gages, machine tool accessories, small plant facilities, miscellaneous supplies, materials and shop equipment. Calibrates, certifies and maintains standard gages and size control equipment. Responsible for storage and inventory control of special tools.

SALVAGE SHOP BRANCH 245

Reclaims by reworking defective material, parts and components rejected during the course of manufacture and assembly.

FUNCTIONAL CHART
of the
Comptroller Department

Bureau of Ordnance
U.S.Naval Ordnance Plant
Indianapolis,Indiana

Approved: [signature] CAPT USN
Title: Commanding Officer

Date: 1 January 1956 | Chart No. 3 (F)

COMPTROLLERS DEPARTMENT 300

Davelops, coordinates and maintains an integrated system of staff services in the financial management area that will provide the Commanding Officer the factual data essential for effecting management control. Implements and administers the station's financial operations under NIF (Working Capital Fund) as authorized by Section 405, Public Law 216 - 81st Congress, and is directly responsible for budgeting, accounting, statistical reporting, internal accounting control, and for the administrative organizational structure managerial procedures relating to such responsibilities within the Naval Ordnance Plant, Indianapolis. Directs the compilation of data for, and formulates the station's budget, coordinating Financial and Manpower Controls and translates the Bureau of Ordnance's Planned Budget Estimates into local programs for production, engineering, research, development and associated support projects. Conducts liaison between the station and the Bureau of Ordnance on all financial matters and analyzes and determines where financial adjustments may be required. Is responsible for the administration, allocation and proper expenditures of all Project Orders, Allotments and Work Authorizations assigning funds to the station. Will establish and maintain a Job Order system to control all direct costs under NIF. Will coordinate and submit all proposals for work, cost estimates and schedules. Develops accounting procedures to implement financial policies and directives promulgated by the Chief of the Bureau of Ordnance and other higher authority. Is responsible for the operation of overall fiscal, accounting and disbursing operations and for the appropriate integration and coordination of the various aspects of the financial management programs. Devises and coordinates preparation of and analyses statistical reports of the fiscal operations in order to properly advise management in its effort to improve efficiency and economy of operation. Is responsible for internal review of accounting and budgeting. Will maintain statistical reports, charts and graphs on progress of workload and finances for the station. Performs other assigned administrative duties as determined by the Comptroller

ASSISTANT TO COMPTROLLER FOR INTERNAL REVIEW 303

Devises and supervises a system of internal accounting controls covering review and examination of the integrity, propriety, effectiveness and adequacy of the financial management and reporting program. Conducts periodic review and examination of accounting and financial statistical reporting at Naval Ordnance Plant, Indianapolis. Conducts periodic reviews, audits, and analyzes informal financial data of other departments. Conducts continuous internal audit of the Comptroller Department. Recommends remedial action to correct defects, based on its reviews and examinations, and recommends changes in procedures and practices to improve the effectiveness of accounting and statistical reporting operations. Advises the Comptroller on matters of organization staffing and administrative procedure within the Comptroller Department. Coordinates preparation of, reviews and maintains Comptroller Department regulations, orders and bulletins, and makes recommendations for changes thereto. Develops and supervises programs for checking labor and material distribution to insure propriety of charges.

ASSISTANT TO THE COMPTROLLER FOR DISBURSING 302

Responsible for assigned disbursing functions as outlined in the Navy Comptroller Manual ,Volume 4. Performs other specially assigned duties as determined by the Commanding Officer.

BUDGET AND STATISTICS DIVISION 310

Compiles the station's annual budget; recommends allocation of funds to departments by program; recommends internal revisions thereof as required. Makes policy recommendations to the Comptroller; prepares directives and instructions to assure compliance with policies promulgated by higher authority; coordinates and prescribes the method of collecting and presenting budget data. Reviews and analyzes raw budget estimates and justifications submitted by department heads. Prepares performance reports for use of the Commanding Officer, Comptroller and department heads in reviewing accuracy of forecasts as compared to actual performance; renders special reports as required. Reviews and analyzes expenditures of funds and recommends budgetary action adjustments where deemed conducive to economical administration. Collects, analyzes and presents statistical operating data to determine estimates to be used in connection with work to be performed in succeeding fiscal periods and to provide estimated costs to be used for budget and control purposes. Prepares statistical reports on fiscal operations as required by local management, the Bureau of Ordnance, and other higher authority on fiscal matters. Prepares graphic presentations of fiscal operations. Reviews and approves all fiscal local forms in use in order to present fiscal data to management in an objective and concise manner. Receives and submits proposals to undertake additional workload, requests funds to support operations not included in the approved annual program. Authorizes work by issuing station job orders and supporting documents.

ACCOUNTING AND DISBURSING DIVISION 320

Makes recommendations to the Comptroller concerning accounting and disbursing matters; prepares directives and instructions to assure compliance with policies promulgated by higher authority. Supervises double-entry accounting records maintained on an accrual basis. Directs the preparation of annual, monthly and interim commercial-type financial reports for local use and for submission to proper authority. Supervises the maintenance of civilian pay records and is responsible for payroll preparations. Directs cost accounting operations; maintains required accounting records including records of obligations and expenditures against allotments and project orders. Supervises the maintenance of Plant Account records and stores material ledgers and records; renders all property returns. Coordinates audit and payment of civil and military payrolls and public vouchers. Coordinates the preparation and submission of disbursing reports and returns. Prepares and accomplishes billings for work performed. Supervises preparation, audit and payment of travel claims. See Chart 3 A 1(F)

MACHINE ACCOUNTING DIVISION 330

Devises methods for the compilation of reports, statements and other statistical data for reproduction on tabulating equipment. Devises forms and develops local procedures to assure accurate and timely reporting. Processes punched cards on tabulating equipment to produce payrolls, checks and accounting reports. Accumulates by EAM operations detail records of material and labor expenditures. Summarizes detail material and labor expenditures by account and job order, and tabulates for administrative, budget and accounting purposes. Prepares tabulated statistical and financial reports as required. Applies overhead and leave costs to job orders. Prepares and maintains interchangeability of parts lists of Aviation Fire Control Equipment for the Bureau of Ordnance. Furnishes EAM services to the Production Department for material and spare parts listings on Job Orders. Furnishes Class Accountability EAM runs for the Supply Department. Furnishes Work Measurement data from labor distribution cards. Prepares other special statistical reports and tabulations for other departments as required.

STATISTICS BRANCH 311

Prepares statistical reports on fiscal operations as required by local management, the Bureau of Ordnance, and other higher authority on fiscal matters; prepares graphic presentations of fiscal operations; reviews and approves all fiscal local forms in use in order to present fiscal data to management in an objective and concise manner; operates a fiscal reports control program in coordination with the Navy Reports Control Program, to assure that reports are essential in terms of actual usage and that unnecessary, duplicating, erroneous or misleading reporting is prevented or corrected; operates a fiscal work measurement program in coordination with other departments of NOP Indianapolis.

BUDGET BRANCH 312

Interprets Bureau of Ordnance budgetary directives into local forms and procedures; develops techniques and standards for preparation of local budget and coordinates requests for funds and personnel from all departments; coordinates presentation of the producing departments cost estimates on productive work programs; reviews and analyzes expenditures of funds and recommends budgetary action and adjustments where deemed conducive to economical administration; prepares analytical reports which show detailed measurement of achievement against planned requirements and recommends remedial action for controllable deviations; receives fund authorizations and issues station job orders applicable thereto.

BUDGET AND REPORTS SECTION

Requests budget estimates of funds and personnel required for planned operations. Reviews and analyzes raw budget estimates and justifications received. Prepares annual, quarterly and special budget and performance reports reflecting Navy Industrial Fund and Appropriation Accounting, financial and manpower data for submission to the Bureau of Ordnance, the Commanding Officer and other echelons of management.

WORK AUTHORIZATION SECTION

Receives fund authorizations and maintains files and records of funds held by the station. Prepares, distributes and maintains files of all station Job Orders, Estimates of Man-Hours and Costs, Industrial Department Schedules, and supporting documents. Maintains control accounts of fund authorizations and allocations thereof to station Job Orders. Maintains records of fund authorization deficiencies and/or excesses. Maintains complete working files on all Job Orders from inception to completion.

MACHINE ACCOUNTING BRANCH 331

Maintains payroll master file. Prepares civilian payrolls, checks, earnings statements, F.I.C.A. and retirement summaries, earnings summaries, W-2 withholding tax forms, service records, clock cards, job cards. Maintains records on checks written other than card checks, and reconciles to treasury statements. Maintains master files on job orders; prepares reports on labor distribution, material cost, public voucher expenditures; applies overhead; furnishes data for job order status, budget analysis, Plant Account, Class Accountability, Stores Returns. Maintains controls on the above.

SPECIAL SERVICES BRANCH 332

Maintains employee personnel master file, compiles retention registers, special personnel reports. Prepares personnel listings for security, and sick bay. Maintains employee address file, prepares hourly and annum rate listings for Public Works. Compiles average hourly rates by cost center when required. Prepares and maintains interchangeability of parts lists of aviation fire control equipment for the Bureau of Ordnance. Furnishes EAM services to the Production Department for material and spare parts listings on job orders. Prepares report of hours by function for Work Measurement Report. Prepares other special statistical reports and tabulations for other departments as required.

FUNCTIONAL CHART OF THE QUALITY DEPARTMENT

Bureau of Ordnance
U. S. Navel Ordnance Plant
Indianapolis, Indiana

Approved: [signature]
Title: Commanding Officer

Date: 1 Jan 1956 | Chart No. 4 (F)

QUALITY DEPARTMENT 400

The Quality Department has the responsibility for the formulation of policies and the direction of inspection and test, and Quality Control functions for the interpretation and enforcement of quality standards for all production materials procured, processed and shipped by the Naval Ordnance Plant. Administers supervisory and liaison tasks incident to quality phases of NOPI subcontracts and certain BuOrd contracts. Establishes the quality standards for this station through maintenance of primary electrical, weight, pressures, temperature, time and dimensional standards, and by controlled calibration of measuring instruments. Counsels with, and assists other department heads in coordinating station policies and procedures, and acts in an advisory capacity to the Commanding Officer on matters pertaining to quality and station administration problems.

INSPECTION DIVISION 420

Direct the overall Inspection program at NOPI, technically and administratively, to insure compliance with specifications and workmanship requirements on all purchased material and equipment and locally produced Ordnance Fire Control Equipment.

Provide assistance to Department Head relative to technical and administrative departmental policies and general inspection, methods and quality matters.

MANUFACTURING INSPECTION BRANCH 420-A

Acceptance inspection and test of all products purchased and processed by the Naval Ordnance Plant to determine their compliance with specifications relative to their physical, chemical, functional, workmanship, and service condition requirements.

Qualified products evaluation of prospective contractors' material and establishment and maintenance of vendor's qualified products list.

Evaluation of second source contracted Fire Control Equipment assigned to NOPI cognizance by BuOrd.

Provide training and technical guidance of Field Inspectors of Naval Material assigned such contracts by the Bureau of Ordnance.

See Chart 4A1A(F)

FINAL ACCEPTANCE INSPECTION BRANCH 420B

Final acceptance inspection and test, of each unit of product, assembly or subassembly produced by the Naval Ordnance Plant to satisfy an "end item" requirement on a project order request. Establish Inspection flow charts in conformance with specification characteristics and manufacturing procedures on products produced by Naval Ordnance Plant, Indianapolis.

See Chart No. 4A1A(F)

QUALITY CONTROL DIVISION 410

Studies, analyses and initiates corrective action for any problems which directly or indirectly affect the quality of products manufactured by, or for, Naval Ordnance Plant, Indianapolis. Performs field supervision and liaison task's incident to administration of quality phases of NOPI subcontracts and certain of BuOrd contracts. Approves or denies waivers on substandard material manufactured by contracts. Prepares and disseminates NAVORD OCD's for Bureau and NOPI use. Furnishes statistical counsel for plant, BuOrd, and vendors. Develops and establishes techniques, statistical and otherwise, required to maintain control of quality of material purchased, processed, and shipped by this station. Formulates and initiates programs for training of personnel in the use of statistical methods of product quality control. Establishes the quality standards for this station through maintenance of primary electrical, weight, pressure, temperature, time, and dimensional standards, and by controlled calibration of measuring instruments. Evaluates material on BuOrd contracts and/appropriate action. Evaluates and maintains cognizance over defective material returned from field. Performs quality assurance function at NOPI, including BuOrd stock.

FIELD ADMINISTRATION 410-A

Co-ordinates phases of field inspection administration of BuOrd contracts and NOPI sub-contracts related to: a. Maintaining in current status files of interim inspection instructions and/or teststive or final NAVORD OCD's furnished to field activities. b. (Handling) requests from contractors for waivers on substandard material. c. (Conducting) training programs covering quality control and inspection policies and procedures for Navel and civilian personnel from field activities. d. Reviewing, analyzing, and evaluating of all reports from field activities. Prepares and forwards periodic summary progress reports to Bureau of Ordnance.

STANDARDS AND CALIBRATION BRANCH 413

Procures, maintains, designs, and repairs station primary standards. Controls calibration of measuring instruments meeting the criteria of plant property Class 3. Provides consulting service on measurements and instrumentation problems. Designs special purpose calibration equipment. Makes equipment available for use of Production and other departments. Stores, issues, inventories, and controls procurement of general purpose measuring equipment.

MEASUREMENT STANDARDS SECTION

Procures, maintains, and repairs station primary standards.
Provides consulting service on measurement and instrumentation problems.
Designs special purpose measuring equipment.

INSTRUMENT CALIBRATION SECTION

Calibrates general purpose measuring equipment.
Stores, issues, inventories, and controls procurement of general purpose measuring equipment.

STATISTICS BRANCH 412

Designs statistically sound, economically reasonable experiments in the interest of product quality. Furnishes statistical counsel for plant, Bureau of Ordnance and vendors. Investigates, develops, and applies both new and established statistical techniques. Analyzes test procedures and results. Assists in statistical presentation, training programs, etc. Directs and controls sampling inspection procedures for all plant material - purchased, manufactured, etc. Directs and maintains control charting operations and associated patrol inspection, summary charts, etc., for all plant materials. Furnishes departmental counsel regarding sampling and/or control charting techniques and procedures. Supervises special sampling techniques. Prescribes location of inspection for purchased material, e.g., at NOPI, at point of supply, etc. Provides liaison with field inspection service pertinent to inspection and sampling techniques and results. Prepares periodic reports covering various aspects of inspection, production, disposition, etc. Furnishes typing facilities for the Quality Control Division, e.g., waivers, source inspection letters, surveillance reports, etc.

STATISTICAL METHODS SECTION

Designs statistically sound, economically reasonable experiments in the interest of product quality.
Investigates, develops, and applies both new and established statistical techniques. Analyzes test procedures and results. Assists in statistical presentation; training programs, etc.

ACCEPTANCE PROCEDURES SECTION

Directs and controls sampling inspection procedures for all plant material - purchased, manufactured, etc.
Directs and maintains control charting operations and associated patrol inspection; summary charts, etc., for all plant materials.
Furnishes departmental counsel regarding sampling and/or control charting techniques and procedures.
Supervises special sampling techniques. Prescribes location of inspection for purchased material, e.g., at NOPI, at point of supply, etc.
Provides liaison with field inspection service pertinent to inspection and sampling techniques and results.

DATA REDUCTION SECTION

Offers departmental computing services.
Maintains histories and records from inspection results.
Prepares periodic reports covering various aspects of inspection, production, disposition, etc. Furnishes typing facilities for the Quality Control Division, e.g., waivers, source inspection letters, surveillance reports, etc.

QUALITY SPECIFICATIONS BRANCH 411

Prepares, reviews, edits, rewrites, and disseminates NavOrd OCD's for use in the acceptance of electrical and/or mechanical parts, sub-assemblies, assemblies, components and systems of ordnance fire control equipment manufactured and/or procured by NOPI. Recommends approval or denial of waivers for sub-standard parts, sub-assemblies, assemblies, components and systems comprising items of fire control ordnance manufactured by and for NOPI, and when specified by BuOrd, for contractors and/or government inspectors concerned with the manufacture and/or acceptance inspection of aircraft fire control equipment procured directly by BuOrd. Establishes and/or interprets standards of quality for visual inspection characteristics. Conducts investigations of abnormally high numbers of rejections in machining and assembly divisions for purposes of determining causes, allocating of responsibility and recommending corrective action.

WAIVERS AND INVESTIGATIONS SECTION

Recommends approval or denial of waivers for substandard parts, sub-assemblies, assemblies, components and systems comprising items of fire control ordnance manufactured by and for NOPI, and, when specified by BuOrd, for contractors and/or government inspectors concerned with the manufacture and/or acceptance inspection of aircraft fire control equipment procured directly by BuOrd. Establishes and/or interprets standards of quality for visual inspection characteristics.
Conducts - for purposes of determining causes, allocating responsibility and recommending corrective action - investigations of abnormally high numbers of rejections in machining and assembly divisions.

QUALITY STANDARDS SECTION

Prepares, reviews, edits, rewrites, and disseminates NAVORD OCD's for use in the acceptance of electrical and/or mechanical parts, sub-assemblies, assemblies, components, and systems of ordnance fire control equipment manufactured and/or procured by NOPI.

QUALITY ASSURANCE BRANCH 414

Evaluates material on BuOrd contracts and initiates appropriate action. Evaluates and maintains cognizance over material returned from the field as defective. Investigates causes of field failure, and recommends corrective and preventive action. Correlates field usage information with production processes. Maintains surveillance of material in BuOrd stock. Verifies the necessity of, and, where necessary, issues orders for re-inspection of material in stores. Conducts special quality evaluation studies. Performs a quality audit of all material manufactured and inspected at NOPI. Evaluates packaging methods and estimates their effective life. Establishes inspection performance rating and over-all quality indices.

FUNCTIONAL CHART
of the
Supply Department

Bureau of Ordnance
U.S.Naval Ordnance Plant
Indianapolis,Indiana

Approved: [signature]
Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 6(F)

SUPPLY DEPARTMENT 600

Headed by Naval Officer with one officer assistant. Responsibilities are: To perform all the Supply functions of procuring, receiving, storing, issuing, process packaging and shipping of all materials and equipment. Processing of receipt and issue documents. Maintaining of proper stock levels. Insuring the availability of requirements for programs. Maintaining and controlling stock records of, and accounts for, all materials. Conducting inventory of materials.Estimates budgetary requirements. The department is composed of four divisions.

ADMINISTRATIVE AND PLANNING DIVISION 620

Performs personnel functions and maintains necessery civilian employee records. Estimates budget requirements. Preperes and maintains organization charts. Preparas the department memorandum and orders for information and guidance of personnel in the department. Performs office functions and processes the department correspondence and maintains general files. Requisitions, maintains stock of and issues stationery stocks to the offices of the department. Maintains work performance reports for department.

INVENTORY DIVISION 610

Inventories all meterial carried in stores accounts in accordance with approved schedules. Reconciles inventory count end stock records and prepares the necessary adjusting documents.

COUNT BRANCH 611

Conducts all inventories of material carried in stores accounts. Counts and recounts quantities of material preperes and corrects count tags, and controls the flow of receipt and expenditure documents during inventory period.

AUDIT BRANCH 612

Reconciles inventory count and stock records.

CONTROL DIVISION 640

Processes Procurement, Receipt and Issue documents. Maintains stock records and schedules material for issue, packing and shipment. Processes surveys of materials and is responsible for matters pertaining to the defense materials system.

See Chart 6A1(F)

MATERIAL DIVISION 650

Receives, stores, process packages, overpacks, preserves, issues end ships material.Provides delivery service for distribution of material. Performs the function of shipment of household effects for Navy and Marine personnel in Indianapolis and surrounding area.

See Chart 6A1(F)

FUNCTIONAL CHART
of all
Branches of
Control and Material Divisions
Supply Department

Bureau of Ordnance
U.S.Naval Ordnance Plant
Indianapolis, Indiana

Approved: [signature]
Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 6 A1(F)

Control Division 640

RECEIPT CONTROL BRANCH 642

Completes receipt documents. Maintains contract requisitions, and order files. Follows up on requests to insure delivery of material. Audits and assembles documents for forwarding to vouchering activity for preparation and payment of public vouchers.

INSPECTION REPORT SECTION

Prepares and/or assembles, records and distributes inspection reports. Prepares, records and distributes rejection reports. Accomplishes incoming bills of lading, except bills of lading covering household goods, and shipment orders. Initiates action covering incoming material lost, or damaged in transit.

FOLLOW-UP SECTION

Maintains follow-up and expediting action to insure delivery of material by required date. Maintains active and completed contract, order and requisition files. Matches dealers' bills (other than those payable by the NIF Disbursing Officer) with accomplished inspection papers and assembles and forwards them to vouchering activity for preparation and payment of public vouchers; forwards accomplished inspection papers covering materials and services payable by the NIF Disbursing Officer to Comptroller. Maintains receiving journal.

PROCUREMENT BRANCH 641

The Procurement Branch procures material and services in accordance with existing regulations and instructions.

PURCHASE SECTION

Procures material in open market by purchase orders and contracts.

BUYING UNIT

Maintains list of bidders, list of approved material and list of ineligible suppliers. Selects suppliers, negotiates prices and contract terms. Opens and records bids and awards contracts. Maintains vendor's catalogs and other information relating to sources of materials and services. Prepares order and contract amendments and modifications. Issues termination notices and arranges for contract settlements.

SERVICE AND RECORDS UNIT

Records incoming requisitions and their progress through procurement. Maintains records of purchases by contract and purchase order numbers; and answers status inquiries on requisitions. Provides duplicating service for Purchase Unit. Distributes purchase documents.

CONTRACT AND ORDER PREPARATION UNIT

Drafts and types contracts and purchase orders; examines negotiated contracts after signature and return by the contractors to insure that no changes or alterations have been made by contractors.

BID PREPARATION UNIT

Drafts, types and mails invitations and bids. Furnishes specifications and drawings to contractors and prospective suppliers.

REQUISITION AND ORDER SECTION

Screens requisitions and determines method of procurement. Prepares requisitions for material from government sources. Places orders for material and services under open-end and running term contract files.

ISSUE CONTROL BRANCH 643

Plans, processes and schedules flow of all issue documents. Furnishes delivery information to requisitioners and requests received from other activities. Screens material requests for accuracy and completeness. Maintains "Stub Registry". Establishes and follows up on established schedules. Accomplishes shipment orders. Expedites delivery from the production line. Bills, collects, and maintains records of cash sales to other government departments, foreign governments, private parties and foreign vessels of war, including custody of payments until released to the Disbursing Officer.

STOCK CONTROL BRANCH 644

Maintains the availability in store of all items of stock in accordance with cognizant Bureau regulations. Maintains stock records. Determines action to be taken on request papers. Initiates action for the redisposition or disposal of excess, obsolete or deteriorated stock.

GENERAL STORES STOCK SECTION

Maintains stock record cards, which includes the recording of all receipts, expected receipts, issues, obligations, and demands. Prepares new stock cards for additional items. Screens for availability of stock. Maintains proper stock levels. Initiates stock replenishment action. Prepares necessary stock replenishment reports as well as all other regular and special stock reports. Recommends substitutions of material. Maintains catalog of Navy material, conversion and cross reference lists. Determines action to be taken on requisitions.

BAR STOCK STORES SECTION

Maintains stock record cards, which includes the recording of all receipts, expected receipts, issues, obligations, and demands. Prepares new stock cards for additional items. Screens for availability of stock. Maintains proper stock levels. Initiates stock replenishment action. Prepares necessary stock replenishment reports as well as all other regular and special stock reports. Recommends substitutions of material. Maintains catalog of Navy material, conversion and cross reference lists. Determines action to be taken on requisitions.

ORDNANCE STORES STOCK SECTION

Maintains stock record cards, which includes the recording of all receipts, expected receipts, issues, obligations, and demands. Prepares new stock cards for additional items. Screens for availability of stock. Maintains proper stock levels. Initiates stock replenishment action. Prepares necessary stock replenishment reports as well as all other regular and special stock reports. Recommends substitutions of material. Maintains catalog of Navy material, conversion and cross reference lists. Determines action to be taken on requisitions.

ELECTRONIC STORES STOCK SECTION

Maintains stock record cards, which includes the recording of all receipts, expected receipts, issues, obligations, and demands. Prepares new stock cards for additional items. Screens for availability of stock. Maintains proper stock levels. Initiates stock replenishment action. Prepares necessary stock replenishment reports as well as all other regular and special stock reports. Recommends substitutions of material. Maintains catalog of Navy material, conversion and cross reference lists. Determines action to be taken on requisitions.

SUB CONTROLLED STORES STOCK SECTION

Maintains stock record cards, which includes the recording of all receipts, expected receipts, issues, obligations, and demands. Prepares new stock cards for additional items. Screens for availability of stock. Maintains proper stock levels. Initiates stock replenishment action. Prepares necessary stock replenishment reports as well as all other regular and special stock reports. Recommends substitutions of material. Maintains catalog of Navy material, conversion and cross reference lists. Determines action to be taken on requisitions.

EXCESS MATERIAL SECTION

Processes surveys and initiates disposal action, and maintains necessary records thereon; arranges for disposition of standard and non-standard material in accordance with existing directives.

D W S ALLOTMENT CONTROL SECTION

Estimate and request allotment of controlled materials, maintains records and grants allotments to consumers

Material Division 650

TRAFFIC BRANCH - 652

Receives and checks all incoming material and delivers to proper destination. Preserves and packs material for shipment and storage. Arranges for shipment of material by commercial and government conveyance. Arranges for shipment of household effects including packing, crating, etc. of authorized personnel and maintains necessary records pertaining thereto. Also arranges for storage of household effects as required.

RECEIVING & SHIPPING SECTIONS

Receives and checks all incoming materials; segregates and forwards material to proper destination; and maintains necessary records pertaining thereto. Makes necessary arrangements for the shipment of material by commercial carriers and government conveyance. Prepares government bills of lading. Institutes tracers on shipments to insure delivery to proper consignee. Maintains necessary records relating to shipment of material.

PACKING & PRESERVATION SEC

Preserves, packages and packs material as required for domestic and overseas shipment or storage.

DELIVERY SECTION

Makes local delivery of material received and makes delivery of material from the store room to fill plant requisitions.

LABOR & EQUIPMENT BRANCH-651

Coordinates requirements for, makes assignments of, and controls the distribution of labor and equipment. Assigns transportation and material handling equipment for use within the Supply Department.

STORAGE BRANCH 654

Receives into store, stores and issues material. Maintains proper care and adequate preservation of material in stores. Identifies and classifies material. Supervises shop stores and operates the scrap yard.

GENERAL STORES & SHOP STORES SECTION

Maintain proper storage and care of material. Receives into store, stores and issues material.

ORDNANCE AND ELECTRONIC STORES STOCK SECTION

Maintain proper storage and care of material. Receives into store, stores and issues material.

BAR STOCK STORES SECTION

Maintain proper storage and care of material. Receives into store, stores and issues material.

SALVAGE AND SCRAP SECTION

Operates the scrap yard. Prepares all scrap, salvage and surveyed material for disposal.

OUTSIDE STORAGE SECTION (OPEN AND COVERED)

Receives, maintains proper storage for all flammable, petroleum, lumber, castings and forgings, technical items awaiting repair, and bulk CSSO items excluding bar stock and issues same.

BUREAU CONTROLLED STORES SECTION (ANNEX)

Maintain proper storage and care of material. Receives into store, stores and issues material.

FUNCTIONAL CHART
of the
Engineering Department

Bureau of Ordnance
U. S. Naval Ordnance Plant
Indianapolis, Indiana

Approved: [signature] U.S.N.
Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 9(F)

ENGINEERING DEPARTMENT

The Engineering Department is charged with the responsibility for the:
Development and design of airborne and other fire control gear including radar, and the preparation and release of technical information.
Technical direction and service in the phases of manufacture, test packaging, installation, operation, maintenance and overhaul of fire control equipment, including radar and other associated gear.
Prepare associated technical information.

ENGINEERING SERVICES DIVISION 910

Provide services used by other engineering divisions, other departments of the station and the Bureau of Ordnance. The division also is cognizant of special projects.
Prepares technical publications for equipment processed at this station.
Provides materials engineering services for the department.
Plans, prepares and maintains standards on design, drafting, shop practice and processing for the station.
Performs evaluation of commercial components, reviews specifications on drawings and maintains files of approved commercial components, and the usage of such items.
Provides technical services and does research on preservation of equipment and design and specification of packaging for all items processed at this station.
Maintains adequate photographic, photo-process and reproduction facilities for the station.
Provides model shop services for the Engineering Department and operates experimental casting laboratory.
Maintains records and files of all drawings under cognizance of the station. Controls issue of drawings and revisions.
Provides a technical staff for controlling use and handling of ball bearings.
Provides field engineering services to support ordnance equipment produced at this station.

FUNCTIONAL DESIGN DIV. 920
See Chart No.9A(F)

PRODUCT DESIGN DIVISION 930
See Chart No.9A(F)

PRODUCTION ENGINEERING DIV. 940
See Chart No.9A(F)

ENGINEERING MANAGEMENT STAFF 902

Maintains the overall effectiveness of the Department through a continuing program of management improvement, planning and the establishment of effective operational procedures. Studies the operation and organization of the Department for the purpose of refinement and adaptation to work situations.
Obtains and analyzes necessary data to determine balance and trends of workload. From such analysis develops information for use in scheduling and shifting work, making more efficient use of manpower and ascertaining capacity for new work.
Reviews and evaluates reports of progress and expenditures and correlates such information for departmental planning.
Develops uniform practices of administrative operations and issues instructions for departmental procedures.
Acts for the department in such fields as forms control, methods of reporting, space and equipment utilization, record keeping, office routines, security review, and the like.
Organizes department personnel programs for recruitment, indoctrination and training in cooperation with the Industrial Relations Department. Maintains personnel records and charts.
Performs special assignments as directed by the Chief Engineer's office.

RECORDS & REPRODUCTION BRANCH 911

Provides staff and facilities for storing and controlling distribution of all BuOrd Record Drawings in custody of this station.

RECORDS and FILE SECTION

Maintains records and files of BuOrd drawings. Controls official distribution of drawings and revisions.

REPRODUCTION SECTION

Provides reproduction services for making copies of drawings, tracings or documents by Black and White, blueprint, vandyke, photolith and photostat processes.

PHOTOGRAPHIC SECTION

Provides complete photographic service for the station, including public relations pictures, pictures for technical illustrations, color photographs for special studies, process photography (name plates, silk screens, etched circuits, etc.) and photographic laboratory services.

ENGINEERING TECHNICAL LETTERS UNIT

Provides typing, clerical, and distribution services to the Engineering Department in connection with the issuance of Engineering Technical Letters and Authorized Deviations.

ENGINEERING CHANGE ORDER UNIT

Provides typing, clerical services to the Engineering Department in connection with the issuance of Engineering Change Orders and Lists of Drawings.

MODEL SHOP BRANCH 912

Responsible for providing complete model making facilities in the Engineering Department. Fabricates prototype of newly designed or modified equipment. Makes experimental parts and models from sketches or instructions from engineers. The Model Shop maintains a tool crib stocked with hand tools and precision measuring instruments to service engineering work shops. A small stock of raw materials and hardware items is also maintained for use of engineers.

MATERIALS & STANDARDS BRANCH 913

Functions as a consulting and coordinating group on problems of specification and application of materials, preparation of design and shop standards and control of anti-friction bearings.

BEARINGS AND PLASTICS SECTION

Assists in the specification, testing, and handling of anti-friction bearings. Act as consultants on applications of plastics, paints, adhesives, rubbers, and lubricants. Manages special projects concerning these problems.

CASTINGS SECTION

Acts as consultants on the design procurement and acceptance of parts, molding forging or any method of casting. Operates an experimental investment casting laboratory to develop and produce prototype models of such castings.

STANDARDS SECTION

Prepares NOPI Standards to promote uniformity of practice in design and production functions at this station. Interprets Bureau of Ordnance Instructions and specifications for coordination with station standards. Provides consulting services on any problem relative to application of standards.

COMPONENTS SECTION

Responsible for maintaining lists of standardized and preferred commercial component items. Assists designers in selection of components and writing of adequate specifications. Act as consultants on design problems involving vibration or shock and assist engineers in conducting shock and vibration testing.

METALLURGICAL SECTION

Assists in the selection, use, specification and treatment of all types of metallic materials. Advises on all problems encountered in the machining and fabrication of metals including heat treatment, forming, and welding.

PACKAGING & PRESERVATION SECTION

Prepares instructions and specifications for all types of packaging and packing required to protect equipment handled at this station. Conducts special studies of packaging and preservation problems.

PUBLICATIONS BRANCH 914

Prepares technical publications used to describe the theory, installation, operation, maintenance, and overhaul of fire control equipment manufactured at this station. Also prepares Ordnance Specifications and testing instructions.

WRITING SECTION #1

Gathers information, writes the text and determines the illustrations for technical publications. Writers work with engineering design groups to develop information required for the technical books.

WRITING SECTION #2

Have functions identical with Section #1. Each is headed by a supervising editor and staffed with writers.

WRITING SECTION # 3

Have functions identical with Section #1. Each is headed by a supervising editor and staffed with writers.

CONTRACTS SECTION

Provides technical direction for contracting of publications writing which cannot be performed at this station because of manpower shortage.

ILLUSTRATING SECTION

Prepares original artwork for pictorial schematics, sectional views, exploded assemblies, etc., used to illustrate the texts of technical books.

WRITING SECTION # 4

Have functions identical with Section # 1. Each is headed by a supervising editor and staffed with writers.

FIELD SERVICE BRANCH 915

Responsible for providing field engineering services for instruments designed, manufactured or overhauled at this station. Provides services including instruction of service personnel, adjustment, and modification of systems. Investigates equipment failures and collects information necessary for correction. Reviews designs of equipment and associated test gear and makes recommendations for improvements based on field experience. Collaborates with the publication groups to insure that technical books meet field needs.

FUNCTIONAL CHART
of the
Functional Design Division
Product Design Division
Production Engineering Division
Engineering Department

Bureau of Ordnance
U. S. Naval Ordnance Plant
Indianapolis, Indiana

Approved: [signature] Title: Commanding Officer

Date: 1 Jan. 1956 | Chart No. 9 A(F)

FUNCTIONAL DESIGN DIVISION 920

Accomplishes the initial phases of development which establish and demonstrate the basis for an item meeting prescribed requirements:
Initiates studies and proposes new development projects.
Delineates general performance requirements for needed ordnance items.
Evaluates new items at appropriate stages of development and at completion of development.
Prepares basic design sketches and functional specifications for new items.
Conducts flight tests to prove the feasibility and suitability of basic designs.
Constantly analyzes and evaluates all available equipment, including foreign, for applicability to naval use.
Studies and analyzes new component items and new processes for use in fire control equipment.
Provides consultant and technical review services for the Engineering Department.
Maintains liaison and assigns personal to other divisions to effect continuity of effort and assure efficient accomplishment of the above functions.

FUNCTIONAL DESIGN SERVICES BRANCH 922

Performs technical analysis, field flight testing, drafting and experimental shop functions as described below. Performs administrative staff functions for the Division Head. This branch is also cognizant of special projects.

ANALYSIS SECTION

Engages in specialized problem analysis with emphasis on the sciences of mathematics, physics and optics. Services are made available to all divisions of Engineering.

FIELD FLIGHT TESTING SECTION

Engages in the instrumentation and execution of field flight testing of newly developed models of fire control instruments and systems.

DRAFTING SECTION

Provides drafting services for the division.

EXPERIMENTAL SHOP SECTION

Provides electronic technician and electronic mechanic type services for the division.

TECHNICAL DEVELOPMENT STAFF BRANCH 921

Observes development project work at this station and other activities. Advises Division Head of technical matters requiring attention. Proposes and pursues advance ordnance developments. Serves in consulting capacity.

FUNCTIONAL DESIGN BRANCH 923

Engages in development of electronic and electro-mechanical circuits for fire control radar and radar-computer applications. This includes analysis and synthesis of components and complete systems.

FUNCTIONAL DESIGN BRANCH 924

The functions of Branches 923 and 924 are nearly identical. The only distinction which can be drawn is that of emphasis on specialized phases of design.

FUNCTIONAL DESIGN BRANCH 926

Engages in developments involving electromechanical and mechanical systems or components. Provides mechanical design services to the entire Division.

FUNCTIONAL DESIGN BRANCH 925

Engages in development involving computing techniques in electrical, electronic and magnetic fields. Emphasis is on development of component items such as servomechanisms, magnetic amplifiers and packaged circuitry required for ordnance work.

PRODUCT DESIGN DIVISION 930

Completes design, following functional design, suitable for production and meeting all service requirements:
Critically examines all details of functional design both from the standpoint of product improvement and producibility.
Strives for simplification and reduction of size without jeopardy to functions.
Determines, specifies, and conducts tests necessary to prove the performance and reliability of final designs.
Makes maximum use of standard parts or components where practicable.
Completely details and specifies all requirements for producing and inspecting the product, from individual parts through overall functioning.
Establishes, through analysis and test, the most liberal tolerances and variations permissible without detriment to end product function.
Designs special equipment for test and maintenance in the fleet and/or installation activities.
Maintains liaison and assigns personnel to other divisions to effect continuity of effort and assure efficient accomplishment of the above functions.

PRODUCT DESIGN SERVICES BRANCH 931

Provides supporting technical and consulting services to the division.

PRODUCTION SPECIALIST SECTION

Reviews product designs for dimensional consistency, accuracy, functional simplicity and producibility. Checks the accuracy and completeness of all Engineering Change Orders prepared in the Product Design Division.

WORKSHOP SECTION

Provides workshop facilities and personnel in support of product design.

STORES SECTION

Maintains stock of items commonly used for construction of models or mock ups. Assists engineers of all divisions by preparing and screening material requisitions for model and experimental use. Provides storage facilities and maintains records for the measuring equipment assigned to Department workshops.

PRODUCT DESIGN BRANCH 932

Prepares final designs and specifications for airborne radar and radar computer devices. Conducts tests to prove that the final design model meets all of the original functional requirements.

PRODUCT DESIGN BRANCH 933

Prepares final designs and specifications for electronic fire control computers, sensing devices and other components of systems (except sights). Also included is cognizance of complete systems which are primarily electronic.

PRODUCT DESIGN BRANCH 934

Has functions similar to those of Branch 933. Principle distinction is that this Branch handles work which is primarily mechanical and electro-mechanical.

PRODUCT DESIGN BRANCH 935

Designs various kinds of sights such as lead computing, fixed and servo controlled. Is also cognizant of associated components such as gyroscopes, control boxes, periscope attachments, etc.

FIELD TEST EQUIPMENT DESIGN BRANCH 936

Determines the requirements for field testing and designs necessary field test equipment for all items manufactured. Designs experimental test equipment for testing of final design models.

PRODUCTION ENGINEERING DIVISION 940

Reviews product and associated equipment designs and performs necessary engineering services in producing ordnance items:
Determines and implements design changes to reduce cost and expedite or facilitate production.
Provides technical assistance on production methods and processes; develops new processes and applies them to products.
Provides engineering services for repair and overhaul programs.
Designs all special equipment required for testing and inspection of products through all stages of manufacture.
Provides technical direction for second source procurement.
Reviews procurement specifications for completeness and adequacy.
Coordinates release of drawings with production schedule to assure availability of component parts, special test equipment, etc., when needed.
Maintains liaison and assigns personnel to other divisions to effect continuity of effort and assure efficient accomplishment of the above functions.

PRODUCTION ENGINEERING SERVICES BRANCH 941

Furnishes supporting technical and consulting services to the division.

PRODUCTION SPECIALIST SECTION

Acts in consulting capacity to design engineers on problems of producibility. Studies designs and recommends changes to reduce cost, standardize tooling or in any way facilitate production.

DRAFTING SECTION

Provides drafting service required for design of special production test equipment. Keeps drawings up-to-date in accordance with Engineering change orders. Trains and indoctrinates apprentice draftsmen for the Department.

WORKSHOP SECTION

Provides facilities and personnel for construction of models, experimental process work and testing. Constructs prototypes of production test equipment designed by the Division.

RADAR PRODUCTION ENGINEERING BRANCH 942

Provides engineering required for producing and overhauling airborne and shipboard radar equipments. Reviews designs and specifications for producibility and adequacy. Initiates changes in design to facilitate production or effect economy. Maintains liaison with the Production and Quality Departments to assist in the solution of problems encountered in producing or inspecting radar equipment.

PRODUCTION TEST EQUIPMENT DESIGN BRANCH 943

Designs special testing devices required for manufacturing and inspecting fire control items including radar. Prepares instructions for use of these devices and the testing of the items manufactured. Supervises the construction and calibration of the first unit of test equipment and assists production personnel in establishing proper usage.

PRODUCTION ENGINEERING BRANCH 944

Reviews designs and specifications to insure complete and adequate releases of engineering information. Initiates changes in design to facilitate and expedite production or to reduce costs. Provides supporting engineering services to assist the Production and Quality Departments in the solution of problems encountered in producing, overhauling, or inspecting fire control equipment.

PRODUCTION ENGINEERING BRANCH 945

Reviews designs and specifications to insure complete and adequate releases of engineering information. Initiates changes in design to facilitate and expedite production or to reduce costs. Provides supporting engineering services to assist the Production and Quality Departments in the solution of problems encountered in producing, overhauling, or inspecting fire control equipment.

PRODUCTION ENGINEERING BRANCH 946

Reviews designs and specifications to insure complete and adequate releases of engineering information. Initiates changes in design to facilitate and expedite production or to reduce costs. Provides supporting engineering services to assist the Production and Quality Departments in the solution of problems encountered in producing, overhauling, or inspecting fire control equipment.

PRODUCTION ENGINEERING BRANCH 947

Reviews designs and specifications to insure complete and adequate releases of engineering information. Initiates changes in design to facilitate and expedite production or to reduce costs. Provides supporting engineering services to assist the Production and Quality Departments in the solution of problems encountered in producing, overhauling, or inspecting fire control equipment.

23-280
4780 SI
Colored Tabs

23-281
4781 SI
Clear Tabs

MADE IN U. S. A.

NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.

PART I

PURPOSE: To summarize, for the purpose of analysis, the general aspects of the production planning and control function at the Naval Ordnance Plant, Indianapolis, Indiana. To analyze the production planning and control function for the purpose of procedures improvement.

SCOPE: Since the function being analyzed is accomplished for the most part in the Industrial Department, primary emphasis will be placed on the methods and procedures employed in that department. Other departments are considered as their functions relate to the performance of the production planning and control function in the Industrial Department. The following organizational segments will be considered as contributing to the performance of this function:

(1) Planning Board

(2) Industrial Department

(3) Comptroller Department

(4) Quality Department

(5) Supply Department

(6) Engineering Department

In addition to the above internal groups, the following external activities will be considered:

(1) Customer

(2) Management Bureau

(3) Vendor

Since the management bureau acts in a dual role of the "Home Office" and as the "Major Customer," the two categories above are used to distinguish between these roles. Certain aspects of this dual role will be discussed in greater detail under Long Range Planning.

In order to analyze the overall characteristics of production planning and control, the following functional areas have been arbitrarily selected for individual analysis:

(1) Long Range Planning

(2) Bid Preparation

(3) Initiation of Production

(4) Manufacturing Planning

(5) Material Procurement Procedures

(6) Manufacturing Procedures

(7) Reporting Procedures

DEFINITIONS

"Long Range Planning" - The design of future operations based on anticipated workload projected for a period of years.

"Production Planning" - The design of future production operations based on know or proposed workload. For the purpose of this discussion, production planning will be considered the first step in Production Control.

"Production Control" - Will be considered as a series of four successive steps:

1st Step...The determination of a standard of performance. This can be considered the Planning phase and composed of the following

five elements:

(1) Men

(2) Machines

(3) Tools

(4) Materials

(5) Specifications

2nd Step...The recording of the actual performance corresponding to the standard.

3rd Step...The comparison of the Standard and the Actual performance and the determination of the Variance.

4th Step...The proper managerial action suggested by the Variance.

LONG RANGE PLANNING: Since the major portion of the workload at NOPI originates in the management bureau it is impossible to separate the planning functions of the two activities. It is absolutely necessary that the planning be based on the most complete information obtainable regarding the production capabilities of NOPI and the anticipated production requirements of the management bureau. Although the primary mission of NOPI has been in the field of Aviation Ordnance, this should not necessarily limit the utilization of the production capabilities to this field. The method of presenting the production capabilities should include the current load imposed on them by known and proposed workload. The presentation should include the available man-hours as well as the type of capabilities in as sufficient detail as can be practically obtained and utilized.

INITIATION OF PRODUCTION: This functional area includes the procedures involved in the preparation of the Job Order. The Job Order is the basic instrument authorizing the performance of work within the plant. One or more Job Orders are issued upon receipt of an authorization from a customer. The Job Order normally includes the following information:

(a) Date

(b) Job Order Number (a four digit number)

(c) Accounting Information (Appropriation No., Expenditure Account No., and Group No.

(d) Type of work (Repair, Modification, Manufacturing, Research, and Development, or Miscellaneous.)

(e) Authority for issuance

(f) Control Department and Distribution

(g) An outline of the specifications

(h) Estimated Completion Date

(i) Originating and approving signatures

Chart I-2 outlines these procedures in general. Part II of the project includes the details of the Engineering Department and Methods Division functions in greater detail.

BID PREPARATION: Chart I-1 is a graphic representation of this function in general. Some of the exceptions to this procedure are as follows:

(1) Drawings and specifications are sometimes available during this phase of production planning.

(2) Certain factors not known to the Industrial Department may necessitate a revision of the schedule or cost estimate as a result of the review by the Engineering Department or the Planning Board.

(3) In some instances a proposal may originate at NOPI as a result of internal action rather than as a result of the receipt of a letter of inquiry from an external activity.

It is considered highly probable that the schedules and cost estimates, which are submitted in many instances on the basis of very limited information, are accepted and considered a valid standard of performance when such validity is questionable. This situation could be avoided to a certain extent by including in the proposal a statement regarding the information which was available as a basis for the estimates.

MANUFACTURING PLANNING: This area includes the procedures which are carried out by the various departments upon receipt of the Job Order, prior to the actual material procurement and manufacturing procedures. Chart I-3 shows the general procedures involved. Part II gives the details of the preparation of the Process Routings. Part III gives the details of the preparation of the Shop Order Kits. Part IV outlines the procedures in the preparation of the Production Breakdown and Material Screening.

MATERIAL PROCUREMENT PROCEDURES: Chart I-4 gives a broad view of this function and Part IV of the project contains the details involved.

MANUFACTURING PROCEDURES: Chart I-5 shows the flow of information, materials and products involved in the manufacturing function. Much of the detail of this function has been omitted except as it affects the production planning and control function. Part IV includes the details of the Progress Branch and Material Control Section.

REPORTING PROCEDURES: Chart I-6 shows some of the major internal and external reporting functions. Most of these functions are for the purpose of providing a record of actual performance and in some instances provides information concerning a standard of performance. For further detail see STANDARDS OF PERFORMANCE and REPORTING ACTUAL PERFORMANCE in following sections.

STANDARDS OF PERFORMANCE: The standards of performance which provide a basis for comparison with actual performance are listed below:

(1) Established by Customer:

(a) Drawings and Specifications - A standard of "what?" is to be produced.

(b) Project Authorization - A standard of "how much?" money is to be expended on "how many?" of the product, and "who?" is to produce.

(c) Acceptance of delivery date - A standard of "when?" production will be accomplished.

(2) Established by Planning Board

(a) Job Order - A standard for internal performance based on standards established by the customer.

(3) Established by Engineering Department:

(a) Drawings and Specifications - A standard for the Industrial Department based on an interpretation of the customer's standard of "what?" is to be produced.

(b) List of Parts and/or material - A standard for the Industrial Department, Quality Department and the Supply Department for the procurement and inspection of material.

(c) Engineering Technical Letters, Engineering Change Orders and Authorized Deviations - The documents which authorize a change in standards of "what?" is to be produced.

(4) Established by the Industrial Department:

(a) Process Routings - A standard prepared by the Methods Division for "How?" production is to be accomplished by the Manufacturing Divisions, and "how long?" each operation should require.

(b) Shop Order Kits - A standard of "when?" production is to be accomplished and a means of transmitting a summary of other established standards. The standard of "when?" indicates only the month in which work is to be accomplished.

(c) Daily and Hourly Schedule - A standard set by the Manufacturing Divisions for individual work.

REPORTING OF ACTUAL PERFORMANCE:

(1) By Industrial Department:

(a) Labor Distribution Card - A weekly record of each individual's performance. The number of regular and overtime hours are recorded daily and identified with the appropriate Work Measurement Code, Account No., Sub-Account, Job Order, Job Order Item, and Shop Order No.

The cards are forwarded to the Machine Records Division of the Comptroller Department and the numbers of hours are translated into costs and summarized according to various categories for accounting and control purposes. Reports by category are forwarded to the Accounting Division and Production Control.

(b) Relieve Custody Form - An indication of the completion of production and the transfer of finished goods from the Industrial to the Supply Department.

(c) Job Order Completion Notice - A notice of the completion of a Job Order.

(d) Copy of Shop Order Kit - A record of "how?" work was performed and "how long?" it took for each operation.

(2) By the Supply Department:

(a) Material Expenditures - A record of the material issued to and returned by the Industrial Department, identified with appropriate Job Order and Item No. and other accounting information. Reports are forwarded to the Machine Records Division and are compiled weekly in the same manner as the labor charges.

(b) Notice of Finished Goods Available for shipment.

(3) By Quality Department:

(a) A report of rejected and accepted products.

Analysis Sheet No. 1

CODE:
"O" → INDICATES ORIGINATING ACTION
"1,2,3, ETC." → ROUTING SEQUENCE
"C" → INFORMATION COPY

	CUSTOMER (BUREAUS, ETC.)						PLANNING BOARD					COMPTROLLER				ENGINEERING				INDUSTRIAL			QUAL.	SUPPLY
	PL. BD.	COMPT.	ENG.	IND.	QUAL.	SUPPLY	COMP.	ENG.	IND.	QUAL.	SUPPLY	ENG.	IND.	QUAL.	SUPPLY	IND.	QUAL.	SUPPLY	VENDOR	QUAL.	SUPPLY	VENDOR	SUPPLY	VENDOR
LETTERS OF INQUIRY	O							1 4								2 3								
COST ESTIMATES (PROPOSITION)								1								O								
SCHEDULES (PROPOSED)								1								O								
PROPOSAL	O																							
PROJECT AUTHORIZATIONS (& CHANGES)		O					C								C O									
DRAWINGS			O													1								
LISTS OF DRAWINGS OR PARTS (L.D.'s)			O													1								
SPECIFICATIONS, DATA, ETC.			O													1								
SHIPMENT ORDERS						O																		
JOB STATUS REPORTS ("PRODUCTION SCHEDULE")				O					C							C					C			
N.I.F. QUARTERLY BUDGETS		O					C					C	C	C	C									
APPROPRIATION QUARTERLY BUDGETS		O					C					C	C	C	C									
BUDGET ANALYSIS REPORT		O					C					C	C	C	C									
FINANCIAL REPORTS (MONTHLY)		O		O			C					C	C	C	C									
CAPITAL EQUIPMENT REQ'M'T BUDGET																								
JOB ORDER (& CHANGES)							C		C			C	O 1	C	C	C				C	C			
FIRM JOB SCHEDULES													1 O											
FIRM JOB COST ESTIMATES													1 O											
PRODUCTION BREAKDOWN ----- ASSEMBLIES																O				C	O 1			
PROCESS ROUTINGS																1 O								
SHOP ORDER KIT (COPIES)																								
MATERIAL SCREENING ----- CASUALTY ITEMS																3 2					O 1			
STUB REQUISITIONS																O		1			O			
CREDIT STUB REQUISITIONS																					O			
MATERIAL SUBSTITUTION ORDERS																1 O								
PARTS SHORTAGE LISTS																					O			
NOTICE OF AVAILABILITY OF MATERIAL																					O			
PURCHASE INQUIRIES																							O	O
BIDS ON PURCHASED MATERIAL																								
PURCHASE ORDERS																							O	O
GOV. FURNISHED MATERIAL																								
PURCHASE PARTS																				2 1 3	2 1 3		2 1	O
RAW MATERIAL																								

Analysis Sheet No. 2

	Customer (Bureaus, etc.)						Planning Board					Comptroller				Engineering				Industrial			Qual.	Supply
	Pl. Bd.	Compt.	Eng.	Ind.	Qual.	Supply	Comp.	Eng.	Ind.	Qual.	Supply	Eng.	Ind.	Qual.	Supply	Ind.	Qual.	Supply	Vendor	Qual.	Supply	Vendor	Supply	Vendor
Labor Rates													O											
Overhead Rates												O	O	O	O									
Budget Estimates per Cost Ctr.												O	O	O	O									
Labor Expended per Job Order													O											
Material Expended per Job Order															O									
Engineering Technical Letters																O	C	C						
Engineering Change Orders																O	C	C						
Authorized Deviations																O	C	C						
Job Order Completion Notices												O	O	O	O									
Memorandum Invoice into Stores													C		C					O			1	
Finished Parts																				O				
Finished Assemblies																				O				
Finished Goods																				O			O	
Relieve Custody Form																				O			1	

CHART I-1

BID PREPARATION

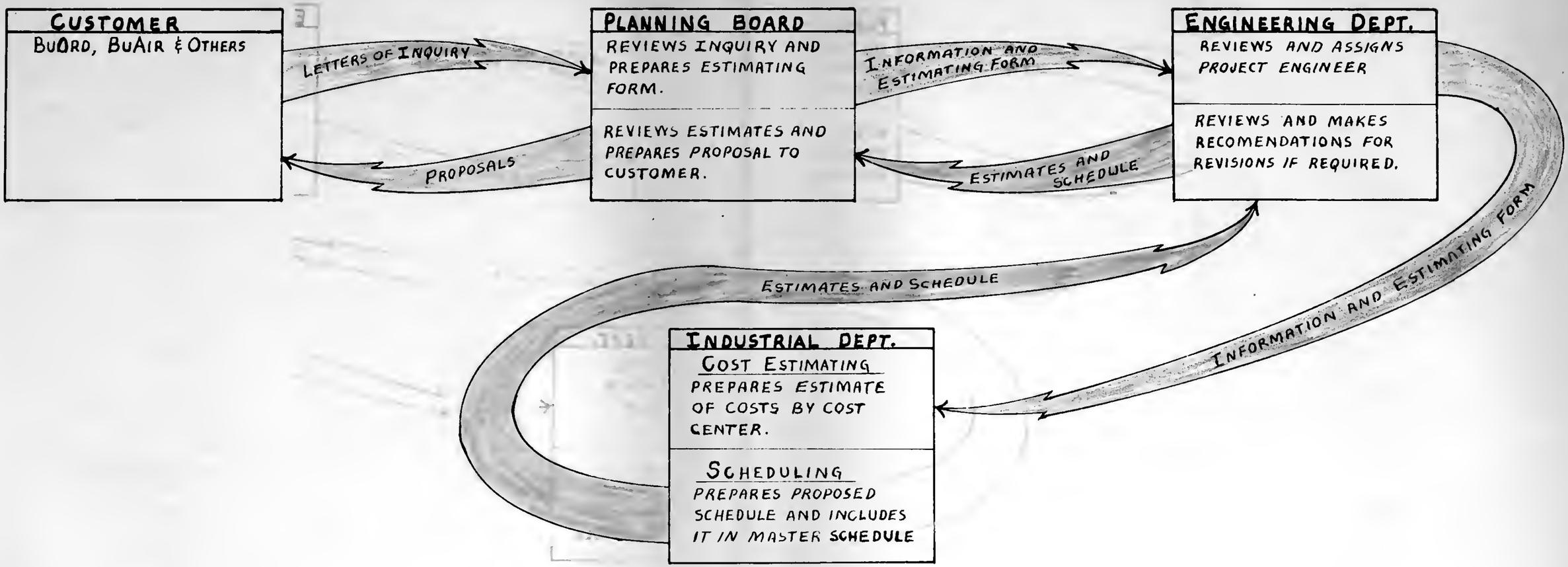


CHART I-2

INITIATION OF PRODUCTION

SEE CHART I-1

PROPOSAL

CUSTOMER

REVIEW PROPOSAL AND IF IT IS ACCEPTABLE, ISSUES PROJECT AUTHORIZATION. IF NOT PREVIOUSLY SENT, DRAWINGS, SPECS., ETC. ARE FORWARDED.

PROJECT AUTHORIZATION

COMPTROLLER DEPT.

UPON RECEIPT OF AUTHORIZATION, JOB ORDERS ARE PREPARED AND DISTRIBUTED.

JOB ORDER INFORMATION

PLANNING BOARD

INCORPORATES JOB IN PLANT PLANNING.

PROVIDES ADDITIONAL INFORMATION IF REQUIRED.

INFORMATION

DRAWINGS, SPECS., ETC.

JOB ORDER

JOB ORDER

ENGINEERING DEPT.

RELEASES DRAWINGS, SPECS., ETC. TO INDUSTRIAL.

DRAWINGS, SPECS., ETC.

INDUSTRIAL DEPT.

MFG. METHODS

DISTRIBUTES LISTS OF DRAWINGS, DRAWINGS AND COPIES OF JOB ORDER

SEE CHART I-3

JOB ORDER (INFO. COPY)

JOB ORDER (INFO. COPY)

QUALITY DEPT.

RETAINS FOR INFORMATION

SUPPLY DEPT.

RETAINS FOR INFORMATION

SEE CHART I-2

CHART I-3

MANUFACTURING PLANNING

FROM COMPTROLLER
JOB ORDER

FROM ENGINERING
DRAWINGS, SPECS, ETC.

INDUSTRIAL DEPT.
MANUFACTURING METHODS

PREPARES LISTS OF DRAWINGS AND DISTRIBUTES.

UPON RECEIPT OF PRODUCTION BREAKDOWN, PREPARES AND DISTRIBUTES PROCESS ROUTINGS.

RELEASES DRAWINGS

LISTS OF DRAWINGS

PRODUCTION BREAKDOWN

PROCESS ROUTINGS

INDUSTRIAL DEPT.
SCHEDULING

PREPARES SHOP ORDER KITS FROM PRODUCTION BREAKDOWN AND PROCESS ROUTINGS.
PREPARES SCHEDULE BY MONTH.

INDUSTRIAL DEPT.
MATERIAL CONTROL

PREPARES PRODUCTION BREAKDOWN FROM LISTS OF DRAWINGS.

INITIATES MATERIAL PROCUREMENT PROCESS (SEE CHART I-4)

PRODUCTION BREAKDOWN

MATERIAL SCREENINGS

SUPPLY DEPT.

SCREENS FOR AVAILABILITY OF MATERIAL.

ASSEMBLY PROCESS ROUTINGS

QUALITY DEPT.

RETAINS FOR PLANNING AND INSPECTION OF ASSEMBLIES.

PROCESS ROUTINGS

DRAWINGS

INDUSTRIAL DEPT.
TOOLING

INITIATES FABRICATION OF TOOLS, JIGS, ETC., FROM PROCESS ROUTINGS AND DRAWINGS.

SHOP ORDER KITS

LISTS OF DRAWINGS

INDUSTRIAL DEPT.
PROGRESS BRANCH

FORWARDS SHOP ORDER KIT AND PROCESS ROUTING TO MANUFACTURING WHEN MATERIAL IS AVAILABLE.

DRAWINGS RETAINED IN PRINT CRIBS AND ISSUED TO MANUFACTURING AS REQUIRED.

PROCESS ROUTINGS

DRAWINGS

SEE CHART I-5 FOR MANUFACTURING PROCEDURE

CHART I-4

MATERIAL PROCUREMENT PROCEDURE

SEE CHART I-3

FROM MFG. METHODS
LISTS OF DRAWINGS

INDUSTRIAL DEPT.

MATERIAL CONTROL

PARTS LISTS PREPARED AND SENT TO SUPPLY FOR SCREENING.

MATERIAL REQUISITIONS PREPARED AND SENT TO SUPPLY.

SUPPLY NOTIFIED OF PURCHASE PARTS SHORTAGE.

NOTE: MANUFACTURED PARTS ARE RECEIVED BY PRODUCTION STORES AND SENT TO ASSEMBLY AS REQUIRED.

PRODUCTION STORES

PURCHASED PARTS REQUIRED WITHIN 30 DAYS RECEIVED FROM QUALITY AND SENT TO MFG. AS REQUIRED.

MATERIAL SCREENINGS
MATERIAL SCREENINGS
STUB REQUSITIONS
PUR. PARTS SHORTAGE LISTS
PUR PARTS STATUS REPORTS

RAW MATERIAL
PURCHASED PARTS
GOV. FURN. MATERIAL
PURCHASED PARTS

SUPPLY DEPT.

LISTS ARE SCREENED FOR AVAILABILITY OF MATERIAL.

INDUSTRIAL ADVISED OF AVAILABILITY OF MATERIAL PURCHASE PROCESS INITIATED.

REVIEWS PURCHASED PARTS SHORTAGES

STATUS OF PARTS SHORT SENT TO INDUSTRIAL

PURCHASE MAT'L RECEIVED & SENT TO QUALITY FOR INSPECTION.

RAW MATERIAL, PURCHASED PARTS, AND GOV. FURN. MATERIAL HELD UNTIL REQUIRED BY INDUSTRIAL MANUFACTURING DIVISIONS.

INDUSTRIAL DEPT.

ASSEMBLING.
MACHINING,
& TOOLING

SEE CHART I-5 FOR MFG. PROCESS

LETTERS OF INQUIRY
BIDS
PURCHASE ORDERS
PURCHASED MATERIAL
GOV. FURN. MATERIAL
PURCHASED MATERIAL
RAW MATERIAL
PURCHASED PARTS (NOT REQUIRED WITHIN 30 DAYS)

VENDORS

BIDS SUBMITTED AND MATERIAL SHIPPED WHEN AVAILABLE AFTER RECEIPT OF PURCHASE ORDER

NAVY SUPPLY SYSTEM

UPON RECEIPT OF AUTHORITY FROM CUSTOMER, MAT'IAL IS SHIPPED.

QUALITY DEPT.

PURCHASED MATERIAL RECEIVED FROM SUPPLY.

ALL RAW MATERIAL INSPECTED AND SENT TO SUPPLY.

PURCHASED PARTS INSPECTED — THOSE REQ'D AFTER 30 DAYS ARE SENT TO SUPPLY, AND THOSE REQUIRED WITHIN 30 DAYS ARE SENT TO PRODUCTION STORES.

PURCHASED PARTS (REQUIRED WITHIN 30 DAYS)

CHART I-5

MANUFACTURING PROCEDURES

INDUSTRIAL DEPT.
PROGRESS BRANCH

SHOP ORDER KITS AND PROCESS ROUTINGS SENT TO MANUFACTURING AS MATERIAL IS AVAILABLE. DRAWINGS ISSUE ON REQUEST FROM PRINT CRIBS.

PROCESS ROUTINGS, SHOP ORDER KITS AND DRAWINGS

ASSEMBLY PROCESS ROUTINGS, SHOP ORDER KITS AND DRAWINGS

INDUSTRIAL DEPT.
MACHINING DIVISION

PERFORMS METAL TURNING, FABRICATING, FINISHING AND METAL TREATMENT OPERATIONS.

MANUFACTURED PARTS

QUALITY DEPT.

INSPECTS FINISHED PARTS AND SENDS TO PRODUCTION STORES

INSPECTS FINISHED GOODS AND SENDS TO SUPPLY

FINISHED GOODS

TOOLS AND EQUIPMENT

MANUFACTURED PARTS

RAW MATERIAL

INDUSTRIAL DEPT.
MATERIAL CONTROL

REQUISITIONS MATERIAL, (SEE CHART I-4), MAINTAINS PRODUCTION STORES AND ISSUES PURCHASED PARTS RECIEVED FROM SUPPLY FOR USE WITHIN 30 DAYS.

MFG'ED PARTS

PURCHASED PARTS

INDUSTRIAL DEPT.
ASSEMBLY DIVISION

PERFORMS ASSEMBLY, OVERHAUL AND TESTING OPERATIONS ON ELECTRONIC AND MECHANICAL EQUIPMENT.

FINISHED GOODS

SUPPLY DEPT.

ALL RAW MATERIAL AND GOVERNMENT FURNISHED MATERIAL GOES DIRECT FROM SUPPLY TO MANUFACTURING.

PURCHASED PARTS HELD BY SUPPLY FOR MORE THAN 30 DAYS GOES DIRECT TO MANUFACTUAING.

TOOLS AND EQUIPMENT

PURCHASED PARTS

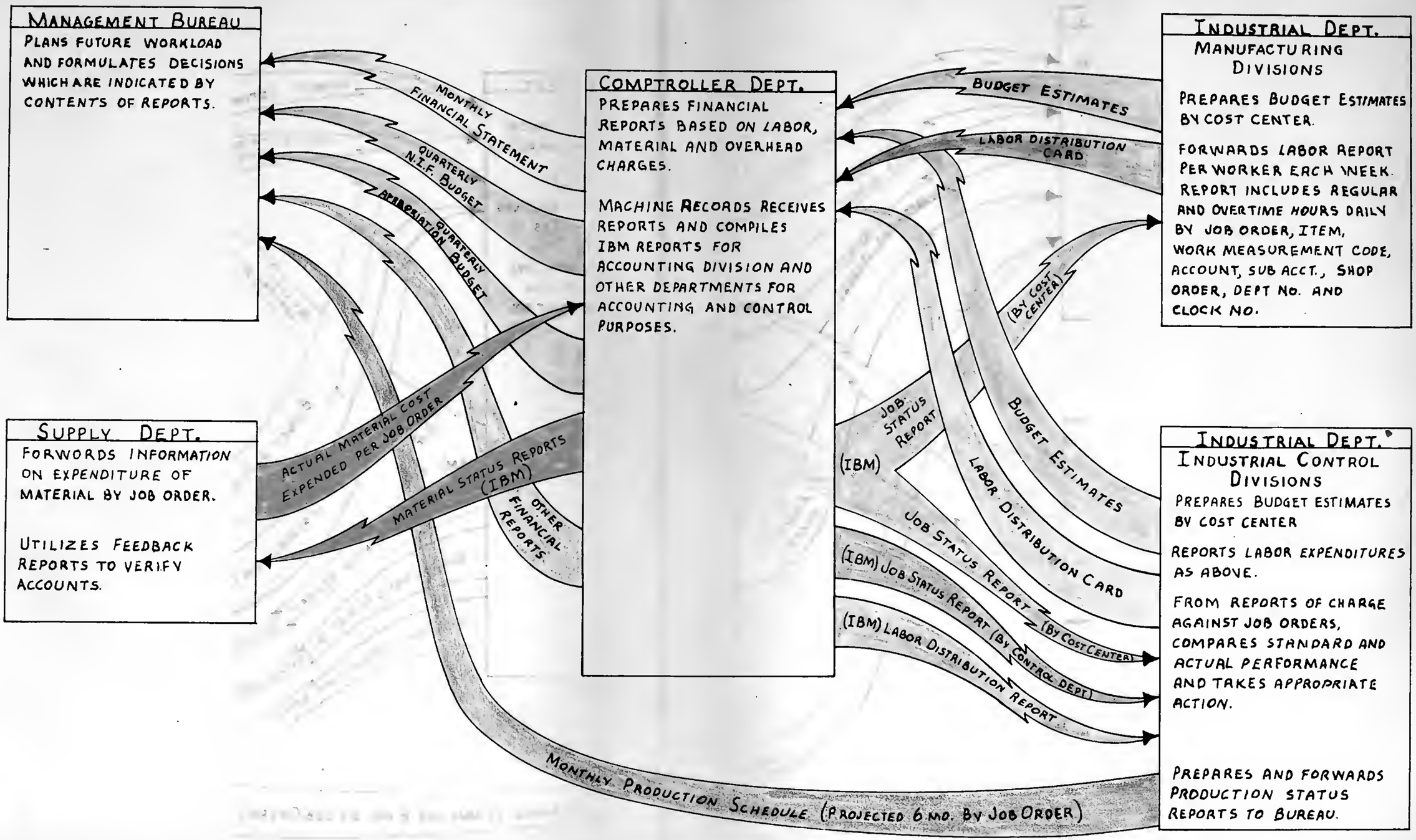
GOVERNMENT FURNISHED MATERIAL

INDUSTRIAL DEPT.
TOOLING DIVISION

PERFORMS TOOL AND GAGE DESIGN, TOOL AND GAGE MANUFACTURE, MAINTAINS TOOL STORES AND PROVIDES TEST AND OTHER MISCELL. EQUIPMENT.

CHART I-6

REPORTING PROCEDURES



OB ORDER	
d. Engr	
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ign Engr	
ation Head	
orded	

MARKS:

. 930	
. 910	
. 914	
. 940	
. 940	
. 260	
nduling	
erial Control	
t Estimating	
nizant Engr.	
. No.	
-310 Coordinator	

U. S. NAVAL ORDNANCE PLANT, INDIANAPOLIS—ESTIMATE OF MAN HOURS AND COSTS

DESCRIPTION OF WORK _____

DATE _____

REVISION _____

CLASS OF ESTIMATE:
Preliminary ( )
Firm ( )

PROPOSITION/JOB ORDER NO. _____

PROJECT ORDER/ALLOT. NO. _____

EXPIRATION DATE _____

CONTROL DEPARTMENT _____

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COST CENTER	EXP. RATE	WAGE RATE	DIRECT MAN HOURS	DIRECT *LABOR	DIRECT MATERIAL	APPLIED OVERHEAD	TOTAL COSTS	
DIV. No. 22	$	$		$	$	$	$	
DIV. 23								
DIV. 24								
DIV. 41								
DIV. 42								
PRES. 61								
DEPT. 70								
TEST DEPT. 80								
DEPT. (D/) 90								
CONTINGENCY ACCT. 99								
TOTALS	$	$		$	$	$	$	

*Accelerated to Include leave accrual cost.

REMARKS: _____

APPROVED BY: _____

_____ (DATE)

E _____ SHEET _____ OF _____

ORDER NO. _____ REVISION NO. _____

OPRIATION: _____

NDITURE ACCOUNT: _____ GROUP: _____

IR _____ WORK _____ MFG. _____ RES. and DEV. _____ MISC'L. _____ PRIORITY _____

HORITY: _____

RIBUTION	SPECIFICATIONS:
TROL DEPT.	

PLETION DATE: _____ COMPILED BY: _____

WORK COMPLETED: WORK SATISFACTORY: _____ O.K. TO APPROVED: _____

Department Head Inspector Commanding Officer

SD-628 Navy (Rev. 10-50), Navy Index [illegible]

ALLOTMENT AUTHORIZATION

NAVEXOS-2674 (9-53)

TO	ALLOTMENT NO.
	TYPE OF ALLOTMENT AUTHORIZATION
FROM	☐ NEW ☐ AMENDMENT NO. _____
TITLE OF APPROPRIATION AND SUBHEAD	APPROPRIATION & SUBHEAD SYMBOL
PURPOSE OF ALLOTMENT *(Name of Project)*	

OFFICE PERFORMING ALLOTMENT ACCOUNTING (This data must be provided)

NAME AND MAILING ADDRESS	ACCOUNTING NO.

AUTHORIZATION

Authority is hereby granted to incur obligations in an amount not to exceed the authority contained herein. When allotments are granted for more than one quarter, amounts authorized for other than the current quarter WILL NOT be taken up until the first day of applicable quarter.

REFERENCE

QUARTERLY AUTHORIZATION	AMOUNT OF ALLOTMENT
(1)	
(2)	
(3)	
(4)	
TOTAL	
PREVIOUS TOTAL	
NEW TOTAL	

DECREASES ARE SHOWN BY "( )"

REMARKS

DATE	APPROVED

-19793

PROJECT ORDER

1. DATE

(See reverse side for instructions in issuing project order)

ORDERING DEPARTMENT OR COMPONENT

ADDRESS

3. PROJECT ORDER NUMBER

4. AMENDMENT NUMBER

PERFORMING INSTALLATION

ADDRESS

STATION NUMBER

DELIVERY INSTRUCTIONS

E

DATE

METHOD

ESCRIPTION OF WORK TO BE PERFORMED AND OTHER INSTRUCTIONS *(If additional space is required, use Supplemental Data Section on reverse side hereof or attach additional sheets)*

ACCOUNTING CLASSIFICATION

PRIATION TITLE AND SYMBOL	ALLOTMENT *(If applicable)*	PROJECT OR EXP. ACCT.	OBJECT	STATION NUMBER	AMOUNT

CERTIFY THAT THIS ORDER IS PLACED IN ACCORDANCE WITH THE PROVISIONS OF THE ACTS OF JUNE 5, 1920 AND JULY 1, 1922 *(41 USC 23)* D DEPARTMENT OF DEFENSE PROJECT ORDER REGULATIONS. WORK TO BE PERFORMED AND MATERIAL TO BE PROCURED PURSUANT TO THIS ORDER E PROPERLY CHARGEABLE TO THE APPROPRIATION OR OTHER ACCOUNTS INDICATED ABOVE UNTIL _____ (DAY - MONTH - YEAR), THE EXPIRATION TE OF THIS PROJECT ORDER. FUNDS IN THE AMOUNT INDICATED ABOVE HAVE BEEN OBLIGATED ON RECORDS OF ORDERING DEPARTMENT.

AND TITLE OF AUTHORIZING OFFICER

SIGNATURE

HE ABOVE TERMS AND CONDITIONS ARE SATISFACTORY AND ARE ACCEPTED.

ACCEPTED

NAME AND TITLE OF ACCEPTING OFFICER

SIGNATURE

D FORM 1 NOV 50 411

INSTRUCTIONS

This form is intended for use by military departments in placing project orders with installations within the Department of Defense.

ITEM 1 - Date of project order or amendment.

ITEM 2 - Name and address of ordering department or component.

ITEM 3 - Number assigned to project order by ordering department or component for control purposes.

ITEM 4 - Number assigned to project order amendment by ordering department or component for control purposes. Formal amendments shall be numbered consecutively.

ITEM 5 - Name, address, and station number of performing installation.

ITEM 6 - Instructions for place, date and method of delivery, if applicable. Where additional space is required for these instructions, use Supplemental Data Section.

ITEM 7 - Full description of the work ordered *(this may be incorporated by reference)* and such other instructions as conditions of inspections; shipping, packing and marking instructions; etc. Use Supplemental Data Section or attach additional sheets, if necessary. Limitations, if any, applicable to the appropriation or other accounts relevant to this order are shown in the Supplemen Data Section below.

ITEM 8 - Insert in these spaces the complete counting classifications chargeable and the amo obligated by the ordering department or compon for the work ordered *(the block entitled "all ment" is to be used only when the ordering depa ment is actually citing an allotment accoun*

ITEM 9 - Insert in the spaces provided, the expi tion date of the project order; the name, ti and signature of officer, or his authorized rep sentative, controlling or having responsibil for the administration of the funds cited on project order or amendment. If authorizing offi is other than one having fiscal responsibili the ordering department must have on file, as s port to the certificate, a written statement such an officer substantiating the fiscal port of the certificate.

ITEM 10 - The performing installation shall in cate acceptance in this space. Duplicate, bear acceptance date, name, title and signature of cepting officer shall be returned to the order department or component. If the performing inst lation is unable to accept the project order, shall return promptly the original project or form to the ordering office with appropriate planation.

SUPPLEMENTAL DATA SECTION

EUEST FOR PERFORMANCE OF WORK

OMPT FORM 140 (4-54)

O			NUMBER	
			DATE	
PPRIATION		ALLOTMENT OR PROJECT ORDER NO.	DATE OF PROJECT ORDER	PRIORITY
GE EXPENDITURE ACCOUNT	ACCT'G NO. OF CHARGEABLE ACTIVITY	ACCT'G NO. OF ALLOT./PROJ. ORDER ACCT'G ACTIVITY	JOB ORDER NO.	
XIMUM AMOUNT AUTHORIZED	WORK TO BE COMPLETED (DATE)	FOR DETAILS, CONTACT		

MONTHLY REPORT OF CHARGES TO:

T IS REQUESTED THAT THE FOLLOWING WORK BE PERFORMED AND DELIVERED AS INDICATED BELOW, WITH THE CHARGES, AND UNDER THE NITIONS STATED ABOVE.

SIGNATURE _____

U. S. GOVERNMENT PRINTING OFFICE 16—60063-3

Date _____

MEMORANDUM

From: Budget Administrator (D/310)
To: Planning Board (D/010)

Subj: Notice of Receipt of Expenditure Authorization

1. Expenditure Authorization No. _____ has been received by this office.

2. The following work is requested by the above authorization:

_____

_____

_____

_____

_____

_____

G. G. TAYLOR

By _____

ORDER NO.

PRIATE M

DITURE ACCOUNT

MCO

ORITY

BUTION

OL DEPT.

ETION DATE

WORK COMPLETED

3	Gas						
4	Water						
5	Pneumatic Power						
6	Refrigeration - Air Conditioning						
	Subtotal						
	Total Manufacturing Exp. - Allocable/Distributable						
	Distributed (To) From Other Cost Centers:						
	TOTAL MANUFACTURING EXPENSE ACTUAL						
	GENERAL & ADMINISTRATIVE EXPENSE ACTUAL						
	TOTAL OVERHEAD EXPENSE						

STATISTICAL DATA

	Current Month			Fiscal Year To Date		
	Actual	Applied	Variance	Actual	Applied	Variance
Mfg. Exp. per direct labor hr.						
Gen. & Adm. Exp. per direct labor hr.						
Total Overhead per direct labor hr.						
	Actual	Budget	Variance	Actual	Budget	Variance
Direct Labor Hours - Regular						
- Overtime						
TOTAL						

Schedule C-

U. S. N O P I

WORKSHEET FOR DETAILED STATEMENT OF PRODUCTIVE COST CENTER OPERATIONS

COST CENTER _____

Month of _____ 19____

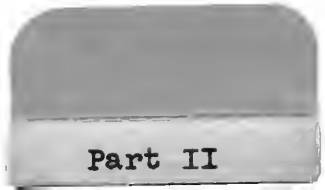
Description	Current Month		% VARIANCE	Fiscal Year to Date		% VARIANCE
	Actual	Budget		Actual	Budget	
Charges to Work In Process:	$	$		$	$	
Materials						
Contractual Services						
Labor - Regular						
Labor - Overtime						
Travel						
Manufacturing Expense Applied						
General & Administrative Expense Applied						
Total Costs to Work in Process						
Charges to Other Costs:						
Materials						
Labor						
Manufacturing Expense Applied						
General & Administrative Expense Applied						
Total Other Costs						
(Over) Under Applied Manufacturing Expense						
(Over) Under Applied General & Administrative Expense						
TOTAL COSTS						
Manufacturing Expense						
Supplies and Services						
M/M Rental						
Administrative Salaries						
Supervisory Salaries						
General Shop Labor						
Standby Labor						
Apprentice - Training						
Reproduction						
Loose and Hand Tools						
Shop Learners - Other Training						
Salvage Correction						
Safety						
Travel						
Repair and Maintenance:						
Buildings						
Productive Machines, Tools & Equipment						
Miscellaneous						
Subtotal						
Overhead Expenses:						

23-280
4780 SI
Colored Tabs

23-281
4781 SI
Clear Tabs

MADE IN U. S. A.

NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.



Part II

PART II

AN ANALYSIS OF THE MANUFACTURING AND ENGINEERING CONTROL FUNCTIONS

A. Manufacturing Methods Division (250) -

A broad statement of functions -

The Division is organized with the basic functions and personnel as shown by the Organization charts 2AF and 2AS. It is primarily charged with the preparation and maintenance of the process routing (machining and assembly) and with the programs to increase production through improved methods. The routings prepared by this Division are used by the shops to machine or assemble the parts. The machines listed in code are used by the Planning Branch of the Production Control Division to chart the machine load in the shops; the estimated time on the routing is used for calculating the man hours load in the shops, also for long range planning. The routings and other processing information are forwarded at the request of the Bureau of Ordnance to various vendors bidding on Navy contracts and are used as a guide by these vendors in setting up their production lines. The Division Head works directly with the vendors assisting them with production problems.

Breakdown of Functions at Branch Level -

The Division is comprised of five branches: Machine Tool Processing (251), Assembly Processing (252), Cost Estimating (253), Methods Records (254), and Manufacturing Development (255). The functional operations and the responsibilities of each branch

will be discussed as follows:

1. Machine Tool Processing Branch (251)

   a. The Manufacturing Methods Division, through the Planning and Estimating Supervisor, is responsible for the preparation and maintenance of the process routings on all machined parts for new, repair or experimental projects. This includes the method of manufacture to be followed by the machine shops and the fabrication of the parts in the most precise and economical manner using the existing facilities of Production Control Division, Tool Design Branch, and Tooling Shops of the Tooling Division, Plating, Painting and Heat Treat Shop of Machining Division and Assembly Division.

   b. Parts lists and Engineering drawings for project job orders are released by the Engineering Department to the Manufacturing Methods Division by use of an Engineering Technical Letter (ETL). Detailed drawings are forwarded to the Machine Tool Processing Branch for preparation of routing for manufacture.

   c. From the breakdown sheets which list the quantity of parts required, quantity of parts on hand and quantity to be made along with the size and type of material ordered for each part, the work is assigned to the Planner and Estimator with instruction as to the type routing required. This information comes to the Planner and Estimator from the Manufacturing Records Branch (254) by means of a

breakdown card accompanying the Routing Jacket. The quantity to be manufactured has a great bearing on the type of routing processed. In cases of a small quantity, the parts are made in the most economical manner with as few tools as possible. If large quanities of parts are to be manufactured, a very detailed routing with numerous tools and gages may be required. Outside contractors who bid on jobs get these routings as part of the job. However, since they are generally made for small quantities and for the tools available at NOPI, they usually have to be revised by the contractor.

d. The process routing is written for each part to be machined and outlines in detail each operation to be performed in the proper sequence necessary to fabricate parts to exact requirements of the drawing. All machine tools and gages required for each operation, together with the machines or equipment to be used are listed, and the organizational segment in which the work is to be performed is designated. Tool design and manufacture orders are written for special tools and gages as specified on the process routings.

e. The type of equipment manufactured, repaired, or modified is: precision, mechanical, electronic airborne fire control equipment, gunsights, radar, bomb directors, bombsights, computers, and component parts.

f. Practically all types of tools and gages used in the Machine Shops are ordered by personnel of the Machine Tool

Processing Branch. For example: drill jigs, milling fixtures, dies (all types), welding fixtures, hobbing fixtures, lathe fixtures, standard gages and special testing gages, and fixtures usually designed around the equipment to be tested.

g. After releasing the routings to the shops for production, changes may become necessary for any one of the following reasons: Engineering change dimensions or materials, sequence of operation, type of machine, tooling, gages, or a change in routing.

h. The process routings must be kept up-to-date at all times, since failure to incorporate an Engineering change at the proper time would result in costly waste of material and unnecessary operational expense.

i. This branch is responsible for the control of all casting molds, patterns, etc. for the manufactured parts. They recommend a vendor to the Supply Department and also include information for inclusion in the purchasing contract. This branch also keeps track of all molds and patterns when sent from NOPI to an outside contractor.

j. This branch orders checks and approves all special tool and gage orders.

k. See Chart II-A and enclosures for an analysis of forms used.

1. Assembly Processing Branch

a. The Manufacturing Methods Division, through the Planning

and Estimating Supervisor, is responsible for assembly processing necessary to accomplish the assembly, calibration and final test of new production, maintenance, repair or modernization of mechanical and electrical fire control equipment, through the proper use of the existing facilities. This branch is responsible for the coordination of all industrial control problems pertaining to assemblers, for example: tooling, calibration, testing, layout, to assure that the finished product is completed to the Engineering Specifications.

b. Engineering information is forwarded to this branch in the form of: Project Orders, Drawings, Engineering Technical Letters, Specifications, and Engineering Change Letters.

c. The projects must be studied in order to determine the best production procedure. Requests for Production Orders, in the form of memoranda, are written by this branch to the Material Control Section of the Production Control Division and outline in general the action to be followed for each subassembly, for example: "Purchase or assemble at this plant." The memoranda are supplementary to the Production Breakdown Sheets, which indicate the availability of parts or sub-assemblies.

d. A Flow Chart is prepared as a guide to assist the Scheduling and Expediting Sections of the Production Control Division.

e. A routing is written for each subassembly and outlines in detail the operations to be performed in the proper sequence,

the shop in which they are to be performed, machines and equipment required, small tools, special tools, test equipment, special instruments, and all references (drawings, specifications, Engineering Technical Letters), necessary to arrive at the correct results.

f. Design and Make Orders are written for special tools, gages and testing and calibrating equipment which is frequently accompanied by sketches showing the desired features to be incorporated into designs. These may be electrical, mechanical, optical or a combination of either or all.

g. Bench and assembly layouts are made and submitted to the Industrial Facilities Division.

h. Types of fire control instruments processed have been listed previously. Types of assembly tools, calibration and test equipment conceived and ordered are numerous, for example: turn tables, circuit analyzers, collimators, bombsight tools, dummy indicators (both train and elevation), elevation calibrators, cycling systems, static dynamic test fixtures and equipment.

i. See Chart II-B and enclosures for analysis of forms used.

3. Cost Estimating Branch

a. The Manufacturing Methods Division, through the Planning and Estimating Supervisor is responsible for the preparation of the cost estimates and proposals, the establishment of standard time for process routings. This time is

used in the allocation of labor (man hours), for scheduling and long range production planning. These duties pertain to the manufacture, repair, maintenance and modernization of fire control equipment through the proper use of existing facilities.

Proposals of Preliminary Estimes

A proposal is prepared for a new or proposed task of manufacture or repair for various equipment previously listed. The basis for proposal cost of a new project is established by visualizing the task in terms of ultimate production. Usually this is extremely difficult because there is no detailed information, such as drawings, specifications or engineering data for reference.

b. When firm estimates are requested, parts lists, drawings and specifications are provided by the Engineering Department. The cost estimator, with the information received, visualizes the design of patterns, tools, test equipment, and assigns an estimate together with operational, material and packing costs, prepares a Cost Estimate and Scheduling Form, computes the man hours required in each organizational segment, then forwards the estimate to the Scheduling Section of the Production Control Division.

c. All process routings are forwarded to this branch for establishment of set-up and operational time. The various operations are studied for the motion an operator must make

to complete the set-up. The speeds and feeds, together with the amount of stock to be removed, are computed into time values and the standard time is set accordingly. The standard time is used in the preparation of Production Shop Kits, in cost accounting and in scheduling.

d. A complete file, Cost Records Cards, is kept active on costs of all parts and materials purchased at this plant. These are to be used in making estimates and supplying cost control information.

e. See Chart II-C and enclosures for an analysis of forms used.

4. Methods Records Branch

a. The Manufacturing Methods Division, through the File Supervisor, is responsible for the efficient operation of this branch. This branch prepares and maintains files and records necessary to receive, record and distribute all Engineering data issued by the Engineering Department to the Industrial Department for manufacturing purposes.

b. All technical data is received, filed, recorded and distributed by this branch. Also, this branch is responsible for: initiating, recording and distributing all routing folders, the assigning of SA numbers to tool orders, recording the tool number, removal and disposition of obsolete technical materials from the various files in the branch. Material includes drawings, parts lists, routings, Engineering Technical Change Letters and revisions.

c. See Chart II-D and enclosures for an analysis of forms used.

5. Manufacturing Development Branch

a. The Manufacturing Methods Division, through the Leadingman, Modelmaker, is responsible for providing an accessible work area for the Planners and Estimators of this division to actually prove new routings by assembling components prior to the release of the routings to the Production Divisions. This branch is to be responsible for the evaluation of existing routings and assisting in solving "in process" production difficulties. The branch will evaluate tooling on new jobs and recommend changes as required. It will also assist the Tooling Division in proving tools before they are put into production. A new process will be evaluated and developed from a production standpoint. The branch will also be an additional source of information as to the quantity of tools, test equipment and special machinery required to meet production schedules. The branch will manufacture preproduction models with the cooperation of the Industrial and other departments.

b. The manufacture of preproduction models permits the Planners and Estimators to prepare a routing as exact and as simple as possible; manufacturing difficulties can be detected during this phase and solutions can be recommended. This will greatly reduce the quantity of Engineering Changes after the job is put into production. It will also reduce production delays in both tooling and manufacturing with the result that the Industrial Department will be much more

efficient. A minimum number of units will be manufactured in this branch. These units, after being properly tested, will become part of the production and not samples or models. The branch will coordinate and be responsible for the manufacture required on joint Engineering and Industrial or Research Job Orders, for example: 74801-2996.

c. The work performed by this branch has a direct effect on all production work in the plant. It gives the design engineer an opportunity to see the manufacturing difficulties prior to release of a project to the industrial shops. This will result in simpler design and provide a more efficient method of getting the job done.

d. The work performed in this branch is in the field of electronics, electrical, mechanical assembly, machine tool and tooling. Technical information must be presented on a variety of subjects to the Planners and Estimators. The branch must assist the Planners and Estimators with any of their problems, such as machining or assembly, so far as possible, within the facilities of the branch. Also, it is the responsibility of the branch to initiate purchase of material and parts for the manufacturing of parts or assembly on these preproduction models. On all tasks assigned to the branch, they must be planned and scheduled to obtain the desired information prior to shop production. Technical decisions must be made to assist manufacturing. The interpretation of all types of drawings and test specifications

is required. The testing of units after final assembly is necessary.

e. See Chart II-E and enclosures for an analysis of forms used.

B. Engineering Department (900)

The Engineering Department is organized and administered according to Organization Charts 9 (F) and 9 (S). A large portion of NOPI's mission is in the engineering design of equipment as well as technical cognizance over outside contracts issued for the production of airborne fire control gear. The brief description of the administration procedures of the Engineering Department which follows is to explain the preparation and functions of information which the Industrial Department uses in their planning, scheduling, ordering, and manufacturing procedures.

1. The Standards Manual is originated, controlled and maintained by the Engineering Department (Div. 913). Its purpose is to control the standardization of the drafting, design, engineering procedures and shop practices used at NOPI. The first section on Engineering Procedures of the Drafting Section lists the functions, description, preparation of all engineering data such as ETL's, ECO's, AD's, etc. which the Industrial Department uses as authority to begin their planning, scheduling, ordering and manufacturing procedures. Since the type of information flowing between the Engineering Department and the Industrial Departments is very dynamic and non-repetitive, much use is made of person-to-person contacts by the project engineers, and by informal letters and memoranda. The few stereotyped forms which they do use are discussed as follows:

   a. Engineering Change Orders (ECO) are used to execute changes

to finished and fully authenticated BU Ord drawings, lists of drawings and specifications under the cognizance of NOPI. ECO's are official documents and may become part of drawings, LD's in applications outside of NOPI. An ECO is generally originated by a project engineer in section 930 or 940. It is authenticated and then forwarded to the ECO Unit, for a number assignment, typing, reproduction and distribution. It is not delayed by waiting for prints, LD or other documents. The originating project engineer is responsible too, for its accuracy, completeness and any necessary concurrence and advance notification to the Production Control Division etc.

b. Engineering Technical Letters (ETL) are used to perform the following functions:

(1) To release drawings, Lists of Drawings (LD's), LDN (LD's at NOPI only) specifications, Ordnance Pamphlets.

(2) To assign serial numbers.

(3) To provide, supplement or release engineering information not concerning drawing deviations.

(4) To authorize contract modifications not concerning drawing deviations.

ETL's are official documents and can be distributed to Bu Ord. vendors and contractors when necessary. These ETL's can be used for:

(1) An initial release.

(2) Partial release for procurement of parts.

(3) Release of old technical information to new JO.

(4) Providing information on technical items.

(5) Assignment of serial numbers.

ETL's are originated by the project engineer, authenticated by the division head and then sent to the ETL unit for a number assignment, typing, reproduction and distribution.

c. Authorized Deviations (AD) are issued by the Engineering Department to permit all non-conformance to any Bu Ord contractor drawing, LD or specification in the Active Files. An AD may be issued against an item or part anytime prior to performance of a production operation which will cause the item or part to deviate from its drawing. They are originated and handled as are ECO's and ETL's. Acceptance of an item or part, during or after production, which is not in conformance with its drawing and any AD's or ECO's issued against the drawing is authorized by means of a waiver issued by the Quality Department, with the concurrence of the Engineering Department.

d. A List of Drawings (LD) is a tabulation of Ordnance drawing numbers, LD numbers and part identification numbers - each with its corresponding title, name or description - and a listing of necessary materials, shipping equipment, inspection and testing equipment, pertinent specifications and other data.

A LD serves as a parts list. LD's are prepared locally by Section 930 (section 940 originates spare parts LD's) or by other Bu Ord activities for all items of Ordnance material bearing a MK and Mod or equivalent designation (AN) and also for assemblies when their complexity or repeated use makes it advantageous. All LD's are released by an ETL.

e. The Drafting Request is originated by the project engineer. It is used as a blanket request for drafting work on an entire group of drawings, on only one drawing, for obtaining a number for a List of Drawings (LD), a Bu Ord drawing or sketch. Any drawing not covered by a Job Identification Number or released by an ETL requires a Drafting Request.

f. See Chart II-F and enclosures for an analysis of forms used.

2. The Records and Files Section (911) distributes all ETL's, AD's, ECO's together with copies of drawings, LD's and specifications. It is responsible for avoiding duplicate distribution of copies previously issued on any other JO. This section also is charged with all reproduction of drawings, etc. and accomplishes this by a Reproduction Requisition when not covered by an original Job Order. It is charged with the storage and distribution of all technical manuals and instructions. This branch keeps track of all the master drawings on Engineering Division Receiving and Distribution Record Cards. All outgoing classified documents are sent with a Document Transmittal Receipt.

3. The Materials and Standards Branch (913) functions as a con-

sulting and coordinating group on problems and specifications, applications of materials (Raw Material Substitution Requests) and control of anti-frictional bearings. The personnel of this branch is consulted when the assigned project engineer is lacking in specialized knowledge about the problem at hand.

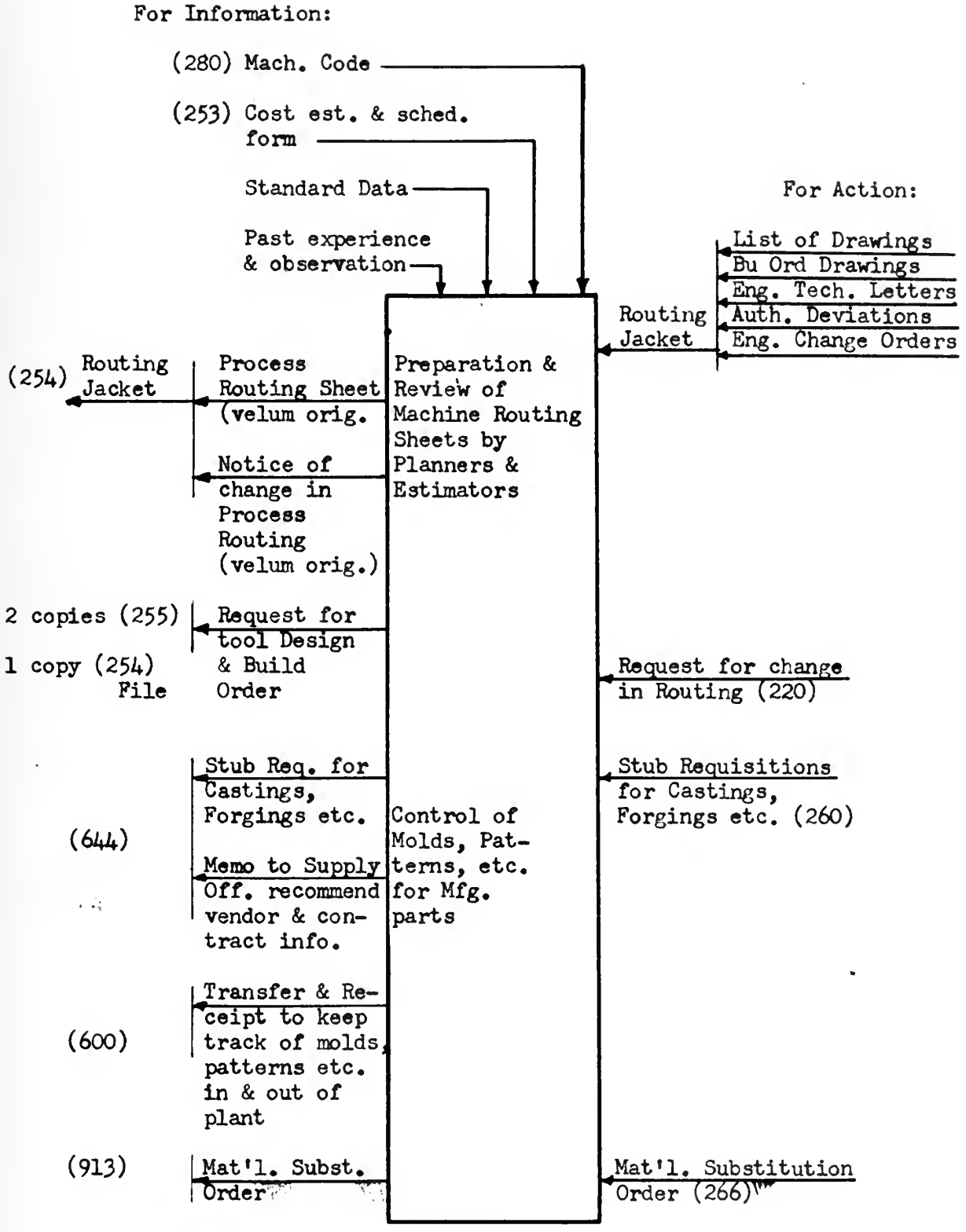


CHART II-A

MACHINE TOOL PROCESSING BRANCH (251)

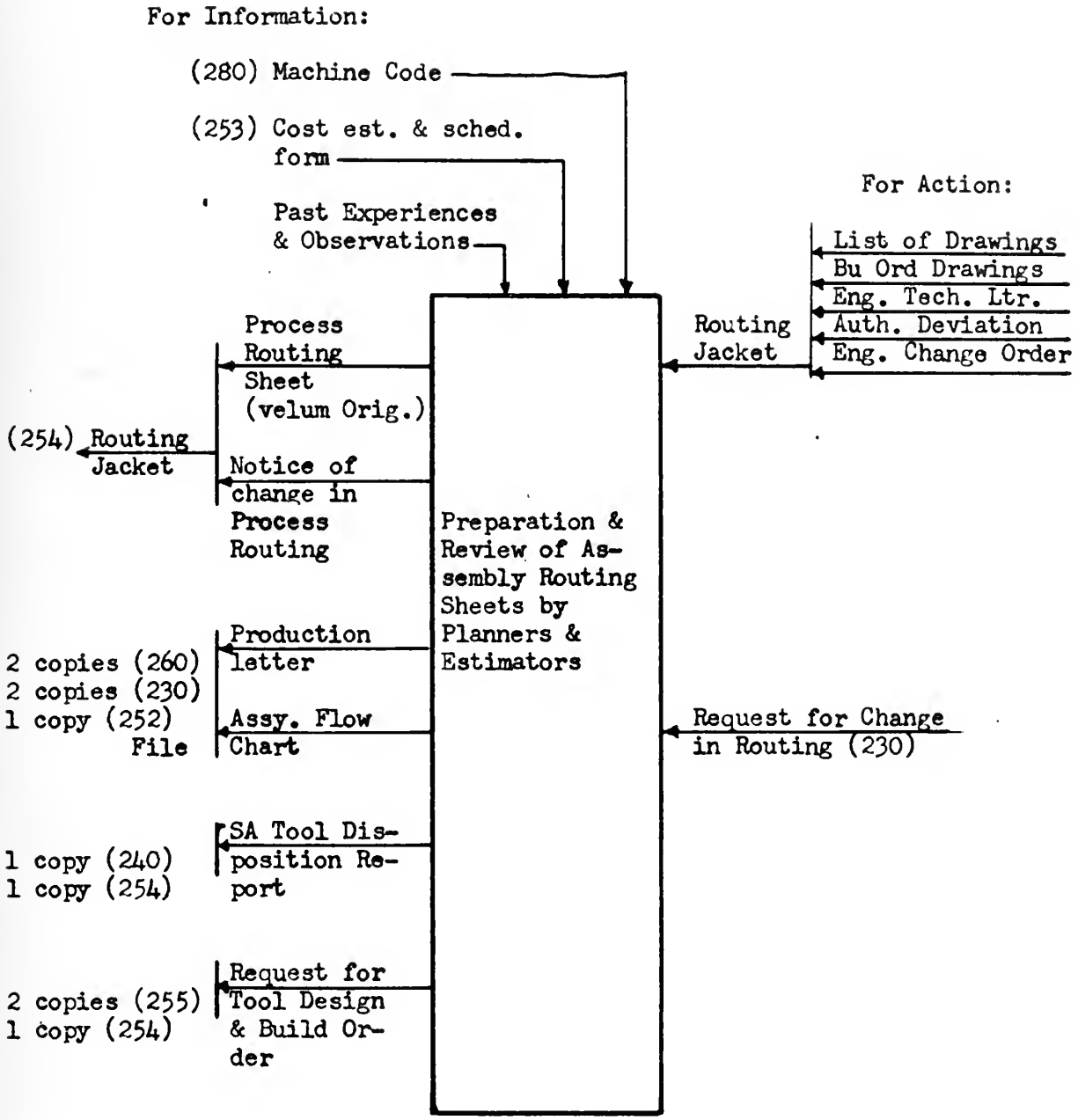


CHART II-B

ASSEMBLY PROCESSING BRANCH (252)

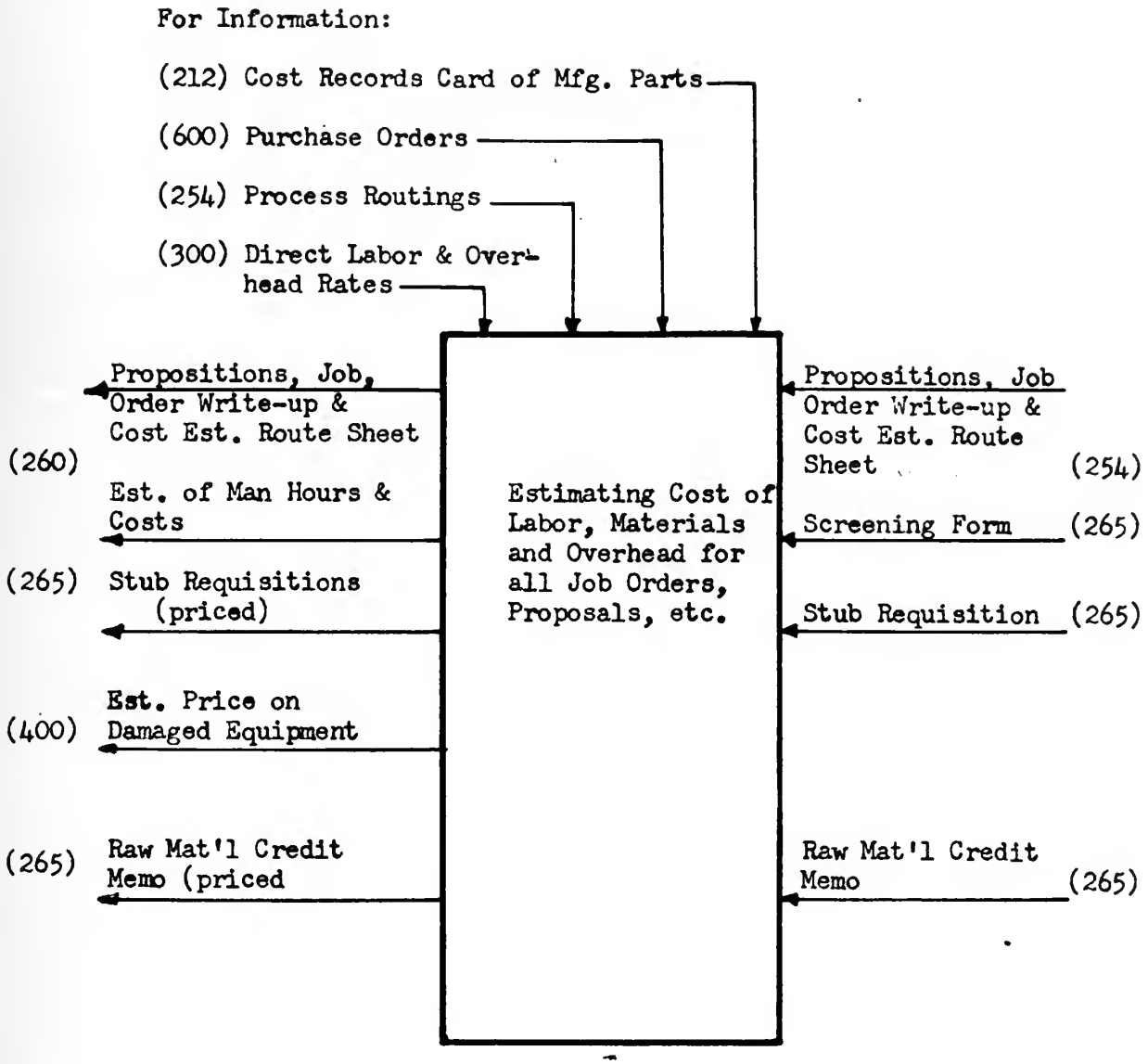


CHART II-C

COST ESTIMATING BRANCH (253)

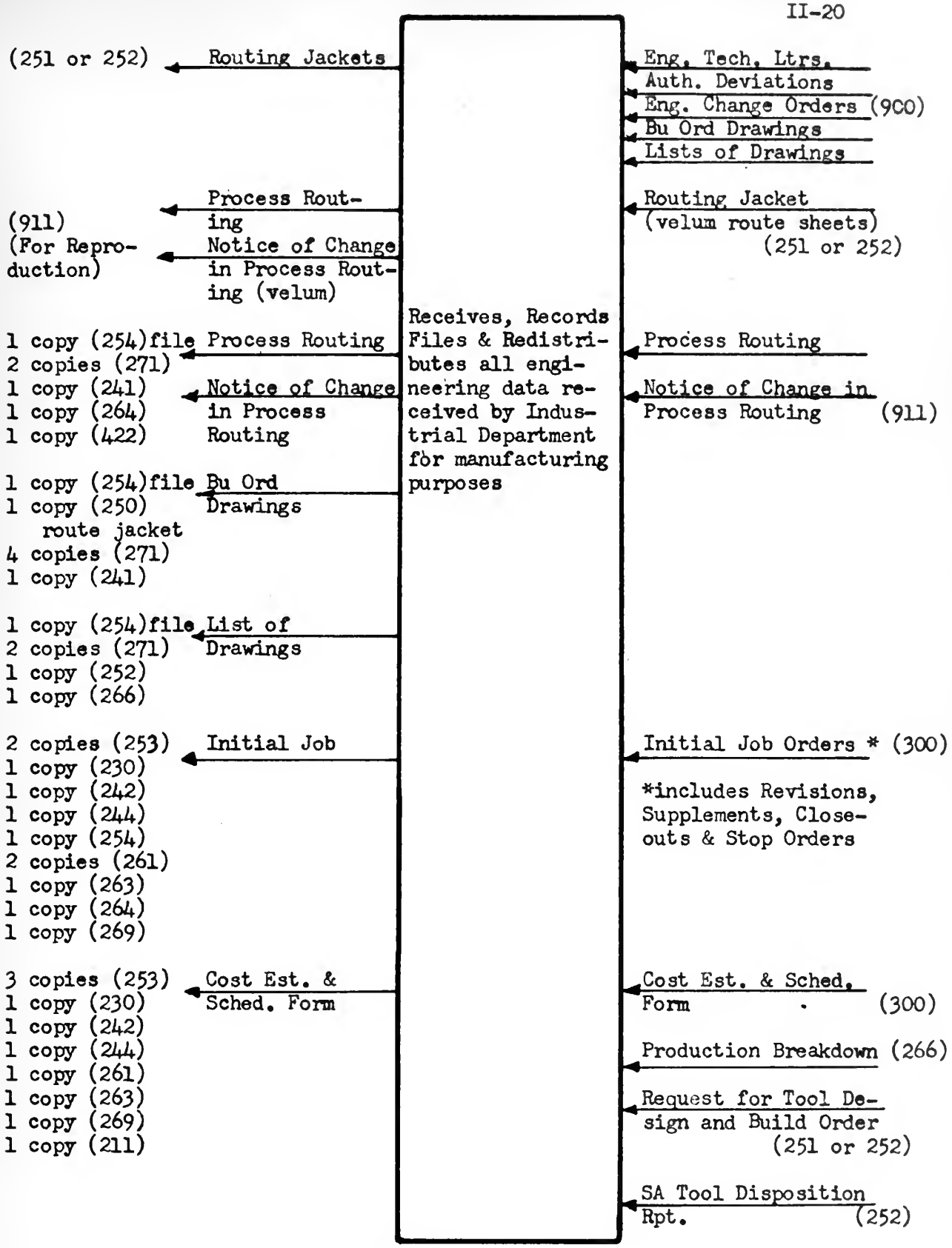


CHART II-D

METHODS RECORDS BRANCH (254)

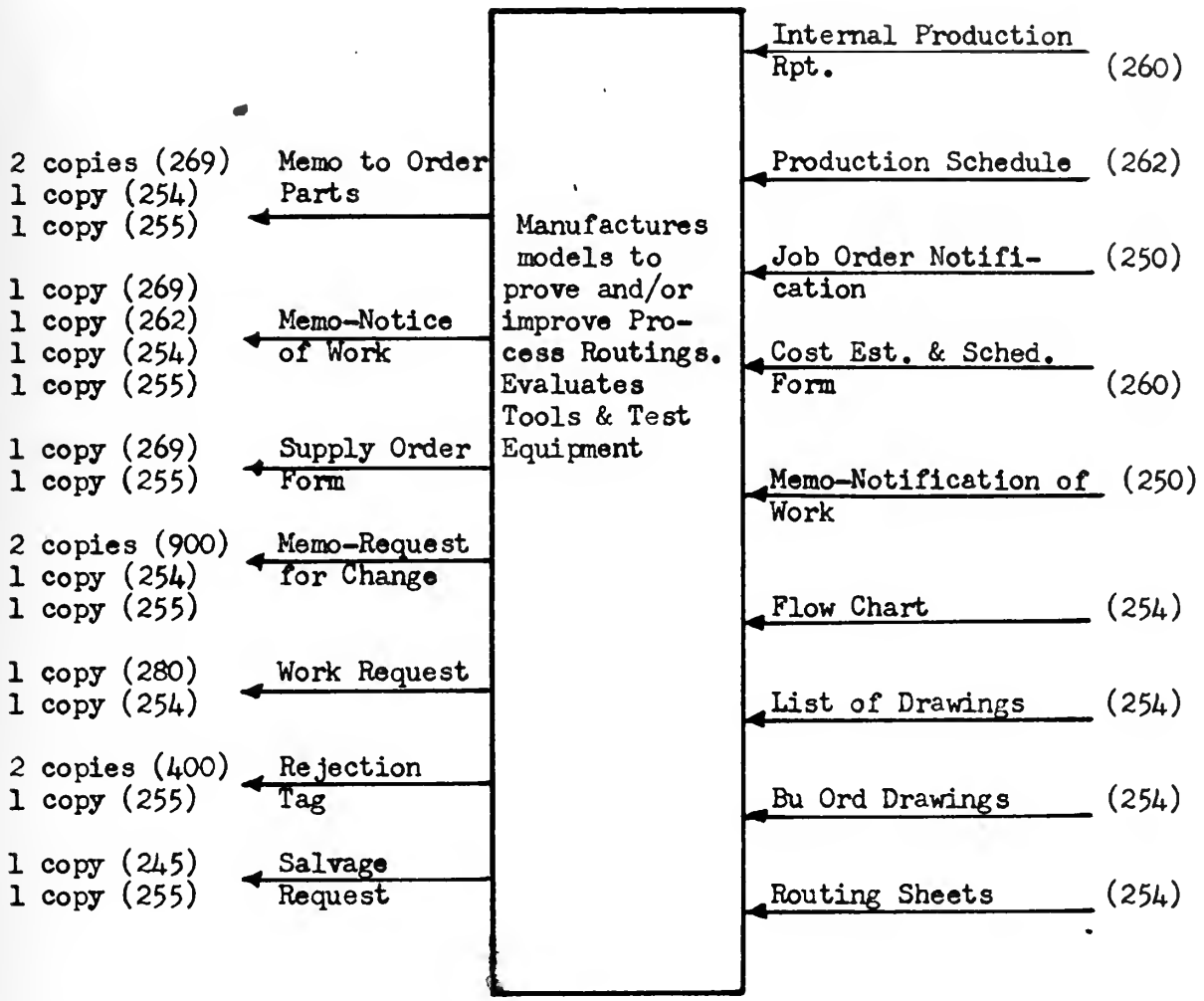


CHART II-E

METHODS DEVELOPMENT BRANCH (255)

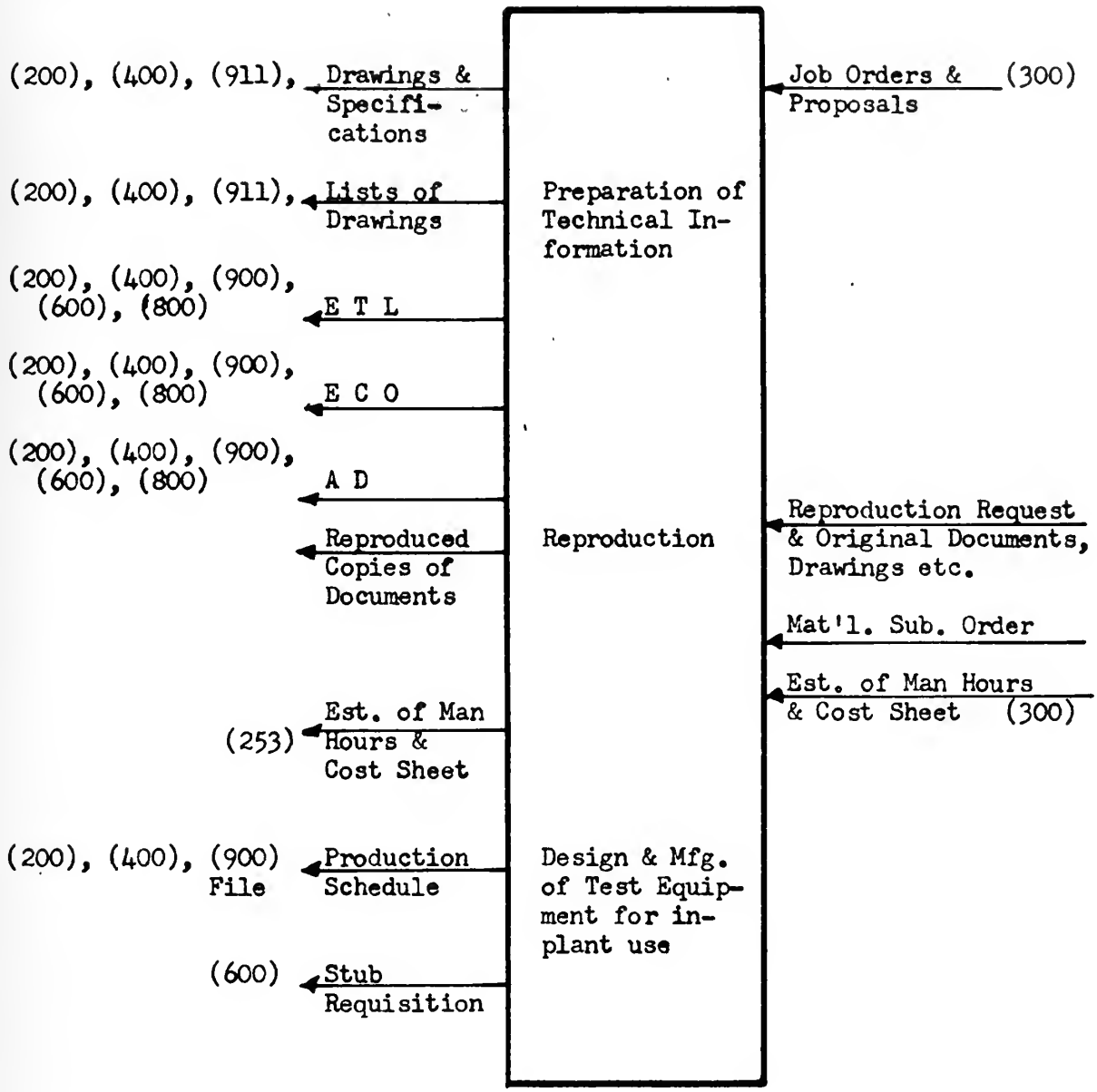


CHART II-F

ENGINEERING DEPARTMENT (900)

REV. NO.

Part III

Part IV

ROUTING

(REV. 8-51)

	PART OR ASSEMBLY NUMBER	ASSEMBLY NAME			
	SPECIFICATION				
	SUPERSEDES DATE	DATE	CHECKED	WRITTEN BY	100 PCS.

MACHINE CODE	DESCRIPTION	TOOL OR GAGE NUMBER	STD. HRS. PER 100 PIECES	SET UP HOURS

NAVY—DPPO,9ND,GREAT LAKES,ILL.

C O P Y

(Pr 252) RBV:ss
JO 3330-1
LD 3133-10
6 January 1956

MEMORANDUM

From: Head, Assembly Processing Branch
To: Head, Shop Scheduling Unit

Subj: PJO 3330-1, LD 3133-10; Kits for

1. Listed below are the assembly part numbers with their breakdown item numbers, along with the assembly flow chart for converting Trail Torque Amplifier CP66 to CP66A.

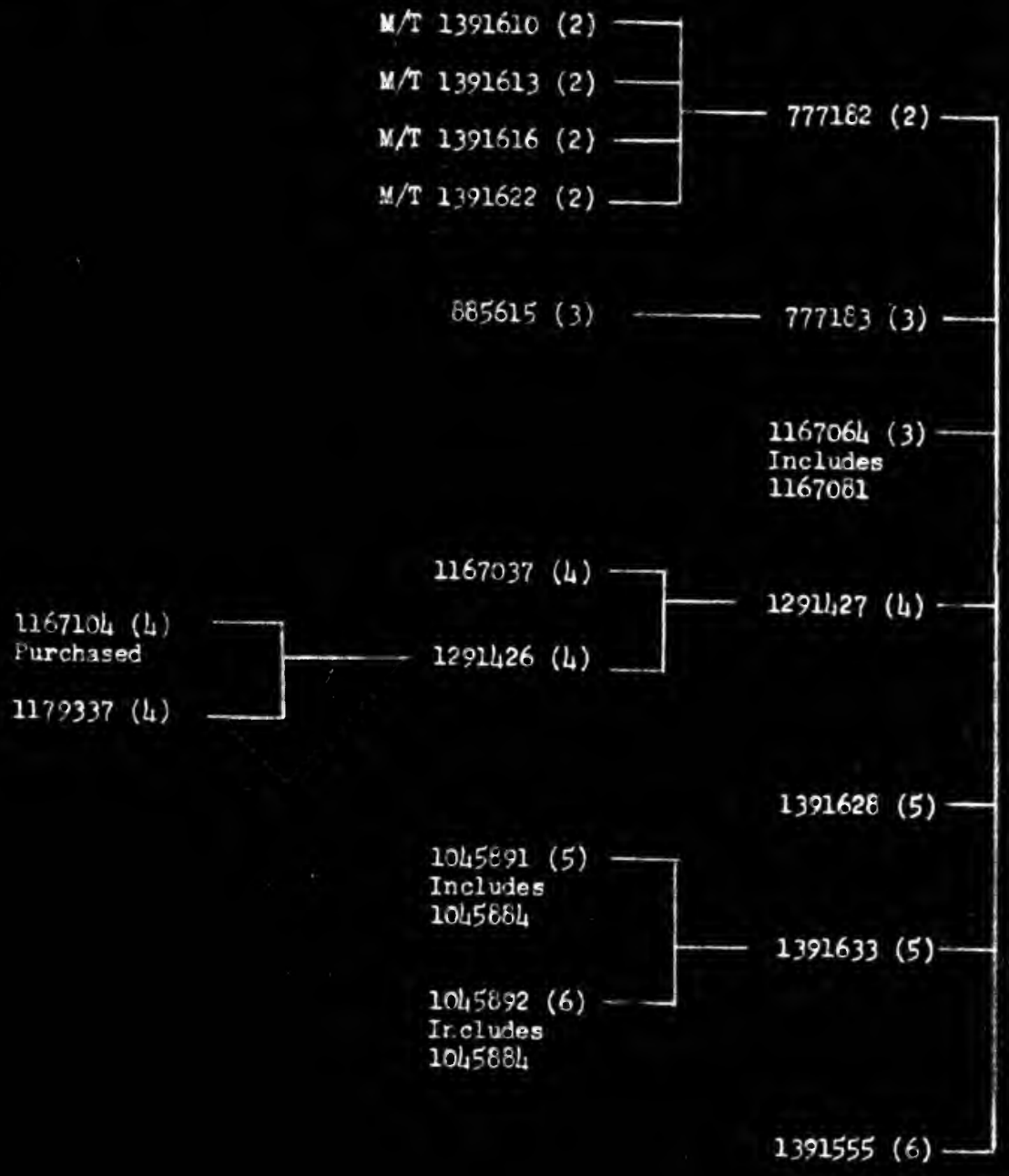
Part No.	Description	P.B.D. Item No.
777182	Gear Box Sub-Assy.	1
1391610 M/T	Gear Sub-Assy.	—
1391613 M/T	Gear Sub-Assy.	—
1391616 M/T	Gear Sub-Assy.	—
1391622 M/T	Plates Sub-Assy.	—
777193	Gear, Cams Sub-Assy.	21
885615	Roller & Pivot Sub-Assy.	29
1167064	Brush Insulator Assy.	38
Includes 1167081		
1291427	Contact Gear Assy.	56
1167037	Pivot Contact Term. Sub-Assy.	53
1291426	Gear & Slip Ring Assy.	62
1167104	Slip Ring Assy. (Purchased)	—
1179337	Gear & Stud Assy.	74
1391628	Pin Sub-Assy.	77
1391633	Clutch Sub-Assy.	81
1045891	Pressure Plate Sub-Assy.	93
Includes 1045884		
1045892	Pressure Plate Sub-Assy.	96
Includes 1045884		
1391555	Coupling Sub-Assy.	99

R. H. WHITE

Copy to:
Head, Assembly Division (2)
Head, Progress Branch (3)

(Pr 252) RBV:ss RBV
JO 3330-1
LD 3133-10
6 January 1956

Flow Chart



NEERING TECHNICAL LETTER
NOP-4044-A (Rev. 6-55) EE-TO

U. S. NAVAL ORDNANCE PLANT
INDIANAPOLIS, INDIANA

SHEET 1 OF 1 SHEETS

E ISSUED	ETL REV.	INSTRUMENT OR SYSTEM	JO. NO.	JO ITEM NO.	ETL NO.
/21/56		AFCS EX-16	2954 3123	1 19	136 60
		UNIT DIODE REFERENCE UNIT (BU 1368610)			
		SUB-ASSY. OR PART R-1503 FOR ABOVE UNIT			
		SUBJECT RELEASE OF HI-TEMP. COEF. RES. BRIDGE SA 2270181			

. THE HI-TEMPERATURE COEFFICIENT RESISTANCE BRIDGE, SA 2270181,
ERIAL NUMBER 1, IS HEREBY RELEASED FOR USE IN PRODUCTION.

CELS AND SUPERSEDES ETL NOS.:

IAL COPY TO
ROGERS D/237. GWALTHER D/940. PWALTER D/244

ION	SIG.—ORIGINATING ENGINEER	SIG.—PROJECT ENGR.	INIT.—DIVISION HEAD
940	ACWILKERSON	HCSTAFFORD	JWC/BDR Date 3/19/56

—DDRO ONO Ahrens Indpls. IN.

INEERING CHANGE ORDER

ORD 537 Rev. 7-53 F-100
-DIPPU 9ND, Great Lakes, Ill.

ECO NO. 1368849 — C
DRAWING NO. NEW REV. LETTER

ISSUED
22 MARCH 1956

U. S. NAVAL ORDNANCE PLANT
INDIANAPOLIS, INDIANA

SHEET 1 OF 1 SHEETS

REASON FOR CHANGE CODE	DISPOSITION AND ORDERING CODE	
Assist Manufacturing	A	To Conform to This Change
Standardize	B	No Effect—Use As Is
Improve Design	C	Rework Per For. No. Only
Clarify Drawing	D	See Remarks
BuOrd Directive	E	
Correct Error	F	
Previously Omitted	G	
See Remarks		

REFERENCES
CONVERTER
MK 37 MOD 0

TITLE PRINTED CIRCUIT BOARD
TB 201

[X] RELEASED [ ] NOT RELEASED

CONFIRMATION TO

Div.

SPECIAL COPY TO

B & W PRINT TO D/947

DISPOSITION AND ORDERING DATA

Engineer	Job Order Number	Op. Item No.	Raw Material on Order	Disposition	Raw Material on Hand	Disposition	Purchased Items on Order	Disposition	Items Not Processed	Disposition	Items In Process	Disposition	Finished Items in Stock	Disposition	Items in BuOrd Stock	Disposition	Special Tools	Disposition
G	2947	2		B		B		B		A		B		B		B		B
G	2948	2		B		B		B		A		B		B		B		B
G	3072	8		B		B		B		A		B		B		B		B
G	3110	25		B		B		B		A		B		B		B		B
G	3301	12		B		B		B		A		B		B		B		B

REMARKS AND DESCRIPTION OF CHANGE (Use Sketch If Necessary) — Reason No.

REMARKS

CHANGE IS APPLICABLE TO FUTURE PRODUCTION.

DRAWING CHANGE

SHEET 1

CHANGE DIMENSION LOCATING THE TWO .166 $^{+\ .001}_{-\ .004}$ HOLES FROM 3.766 TO 3.687. — 3

VISION	SIG.—ORIGINATING ENGINEER	SIG.—PROJECT ENGINEER	INITIAL—DIVISION HEAD
940	L. R. ALBERS	L. R. ALBERS	JWC/EBG Date 3-20-56

2072-2143(32)

AD NO. 1391231 REV. NO. 1 SH. 1 OF 1 SHEETS

AUTHORIZED DEVIATION
NOP-3033 E-55 Rev. 10-62

U. S. NAVAL ORDNANCE PLANT
INDIANAPOLIS, INDIANA

SHEET 1 OF 1 SHEETS

DATE 3/21/56

INSTRUMENT OR SYSTEM: COMPUTER CP66A

TITLE OF DRAWING: BRACKET

PIECE NUMBER(S)

☐ CASTING, MOLDING, FORGING, EXTRUSION.

COPY TO BUORD (Qq).

ADVANCE COPY FORWARDED TO:

SPECIAL COPY TO: NLC

CANCELS AND SUPERSEDES AD NO.: 1391231-1

REASON FOR DEVIATION

	EXPLAIN:	APPROVABLE JO'S	LOTS
ASSIST MANUFACTURING		3135	6
ASSIST PROCUREMENT			
CLARIFY DRAWING #			
BRING SPEC., DWG. UP-TO-DATE #			
IMPROVE DESIGN #			

NOTE: NOP INDIANAPOLIS DOES NOT HAVE DESIGN COGNIZANCE.

USED IN: RANGE LIMITS MECH.

DESCRIPTION OF DEVIATION (USE SKETCH IF NECESSARY)

ADD RUNOUT LIMIT INFORMATION THUS:

T.I.R. OF C_L OF .3750 $^{+.0002}_{-.0000}$ BORE AND PERPENDICULAR TO 63

SURFACE NOT TO EXCEED .0003/IN.

DIV.	INIT. -- ORIG. ENGR.	SIG. -- PROJECT ENGR.	INIT. -- DIV. HEAD	INIT. -- ENGR. BRCH. SUPT.
040	CMA	PBLODGETT	JWC/DB	

23-280
4780 SI
Colored Tabs

23-281
4781 SI
Clear Tabs

MADE IN U. S. A.

NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.

PART III

ANALYSIS OF THE SCHEDULING FUNCTION

A. Planning Branch

The specific duty of the Planning Branch is to direct the activities of the Scheduling and Material Control Sections. Responsibilities include the following:

1. Master planning and scheduling of all phases of those Project Orders which are assigned to the Industrial Department.
2. Planning for, and scheduling of tools, parts, subassemblies, and final assemblies as required on Project Orders assigned to the Industrial Department.
3. Ordering and storing raw materials and finished parts in order to supply production orders to comply with the completion and delivery date of the master schedule.
4. Preparation and submission of reports and charts reflecting the overall plant load and production schedule to Management and BuOrd.
5. Submission to Management of those reports which show efficiency of Shop performance and progress.

As shown in the Functional Chart of the Industrial Control Divisions, the Planning Branch is given the following functions:

"Coordinates Scheduling and Material Control Section activities. Assists in the formulation of policy concerning plant ability

to absorb load. Recommends future action to be taken, increasing or decreasing direct labor complement. Advises type of work required to maintain plant load. Handles special assignments concerning the need for production statistics not normally available.

B. Scheduling Section

As described in the Functional Chart of the Industrial Control Divisions, the functions of this section are shown to be to:

"Coordinate the Master Scheduling and Shop Scheduling activities. Provide statistical information concerning these functions not prepared in a routine manner. Establish policy to meet current scheduling needs of manufacturing divisions."

More generally, this section is responsible for all phases of scheduling of Project Orders assigned to the Industrial Department as follows:

1. Over-all scheduling of projects and phases of projects which may be assigned to the Industrial Department.
2. Detailed planning and scheduling of tools, individual parts, sub-assemblies, and final assemblies.
3. Preparation of Production Schedules.
4. Preparation and maintenance of manload charts, forecast of monthly productive labor, machine load charts, etc.
5. Review of the accuracy of all productive labor charges

relative to job order, shop order, etc., as well as accumulating labor costs and reporting excessive charges for manufacturing individual parts and assemblies.

6. Policing of the over-all plant schedule in the Assembly and Machining Department to prevent the development of bottlenecks. Any such findings form the basis for sub-contracting work, or rescheduling before the schedule is missed.
7. Check all correspondence, charts, which leave Scheduling for errors in accuracy and judgment.
8. Develop procedures and policies for special work assignments assigned by Planning. These generally fall into the category of such items such as special scheduling problems and future work loads.

C. Master Scheduling Unit

This unit "Provides master scheduling on an overall, long range basis at the project order level. Determines where new project orders may fit into the overall schedule. Develops production charts and progress reports."

More specifically, the duties and functions entail the following functions:

1. Establish the schedules for all projects which are assigned to the Industrial Department.
2. Prepare and submit to the Management and to BuOrd, re-

ports and charts which reflect production schedules, and overall plant load.

3. Develop and maintain visual load boards which show the estimated labor hours required by Machining and Assembly to meet the monthly schedules.
4. Develop and maintain visual load boards which indicate the schedules and shipments of urgent Project Orders.
5. Special assignments concerning the feasibility of accepting work, availability of labor and labor requirements including consideration of required skills needed to meet the demands of certain special tasks.
6. Review existing schedules to insure that shipping conditions and requirements are being met.

D. Shop Scheduling Unit

"Provides detailed completion dates for each part, sub-assembly and major assembly to be produced as outlined by the master schedule. Maintains statistics concerning number of man hours loaded, material available for production and performance data. Maintains manload information by shop section for Machining Division and overall load for tooling and Assembly Divisions. Issues all shop orders."

A more detailed analysis of the functions of the unit shows that it is responsible for the following duties:

1. Detailed scheduling of all component parts to be manufactured.
2. Scheduling of sub-assemblies, and final assemblies.

3. Scheduling of design and manufacture of all tooling.
4. Preparation and reporting of Man Load Data.
5. Issue and release all shop order kits for the manufacture of individual parts, assemblies, and tooling.
6. Preparation of transfer papers for items manufactured by the Industrial Department for routing from Project Job Orders to Supply.
7. Prepare and maintain records of all transfers made against manufacturing orders, withdrawals and return of instruments and/or parts drawn for repair.
8. Prepare and submit reports of labor costs for all shop orders of individual parts, sub-assemblies, and final assemblies.
9. Compile data for the Machine Load Data, for incorporation on the Production Boards.
10. Prepare and submit the Monthly Production Schedule.
11. Special assignments relative to machine loads for specific types of machines, special cost information, immediate scheduling demands of unexpected urgent Job Orders, etc.

COST ESTIMATING — Cost estimates

BuOrd — Latest delivery requirements

ENGINEERING — Prints, & parts lists

PLANNING — Request for rescheduling

MACHINERY & ASSEMBLY DIVISIONS — Facilities available, & Plant Load data.

BUDGET ADMINISTRATOR — Availability of, funds & extension of,

PURCHASING — Purch. mat'l delivery dates.

COST & ESTIMATING DATA

MONTHLY INVENTORY FIGURES

MANUFACTURING METHODS — Process Routing, and dates

MASTER SCHEDULING UNIT

Convert dollars into hours using current average pay rates.

Determine type of work involved, magnitude of job, etc.

Determine if the job is possible.

Determine workable dates if delivery practice on materials is not standard.

Establish Schedule date.

Establish and firm-up Schedule.

SHOP SCHEDULE UNIT

Makes daily postings, of shipments made, against the order.

VISUAL WORK LOAD BOARD

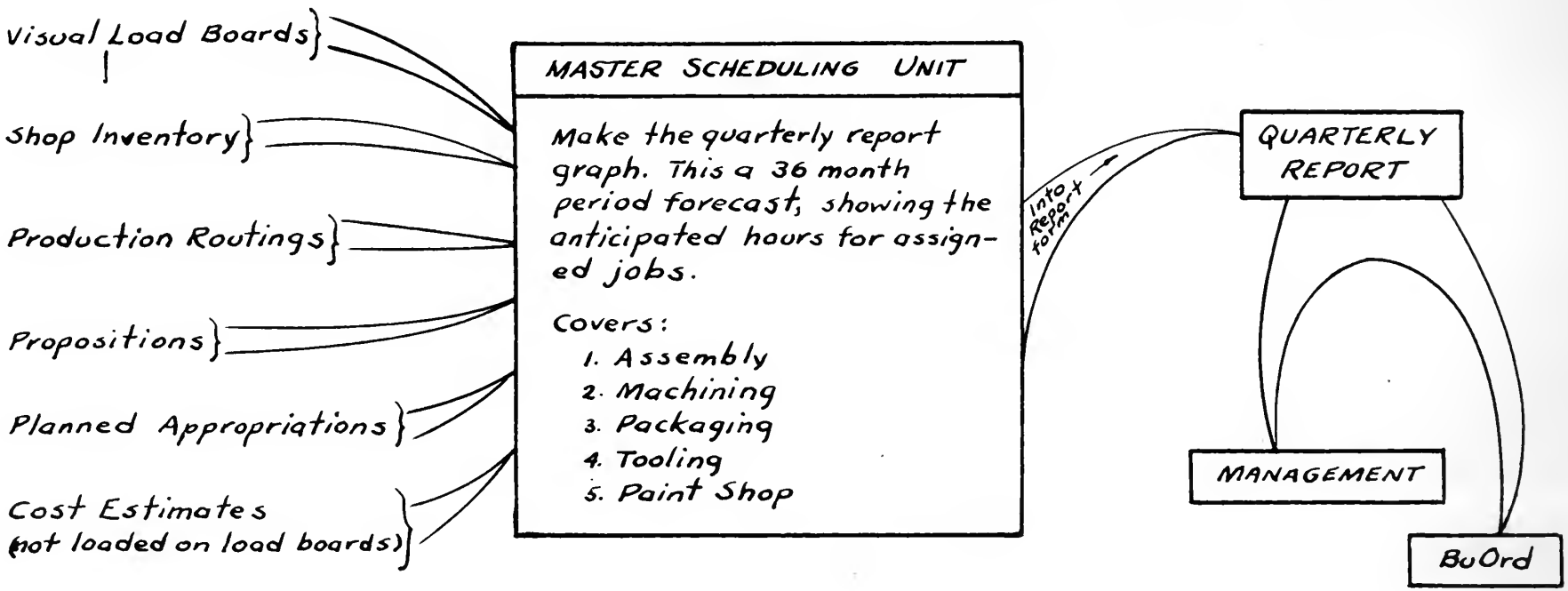
Indicates hours required by ASSEMBLY & MACHINING for Job Orders – by month.

Gives totals for current Job Orders.

INTERNAL Schedule

Gives due dates to supporting services of the Production Control Division

SCHEDULING FUNCTION



QUARTERLY REPORT

Future Appropriations Data

Planned Work

Comparison of past averages, with current personnel ceilings.

Relative Efficiency of Shops.

Breakdown of shop time charges.

Monpower Report

MASTER SCHEDULING UNIT

Determine when work will become available.

Predict Machining and Assembly work.

Determine effect of additional work on present load.

Predict the required labor load.

Comparison of additional work with present work.

Anticipate sick leave and leave in determining man-load.

Adjust loaded hours by the ratio of the relative shops' efficiency.

MACHINING and ASSEMBLY Manload and Performance charts

Show graphic representation of total work load by weeks, in terms of manhours and relative efficiency.

Show potential of shops to perform, in terms of man-hours, actual performance, and the weighted averages of such performance.

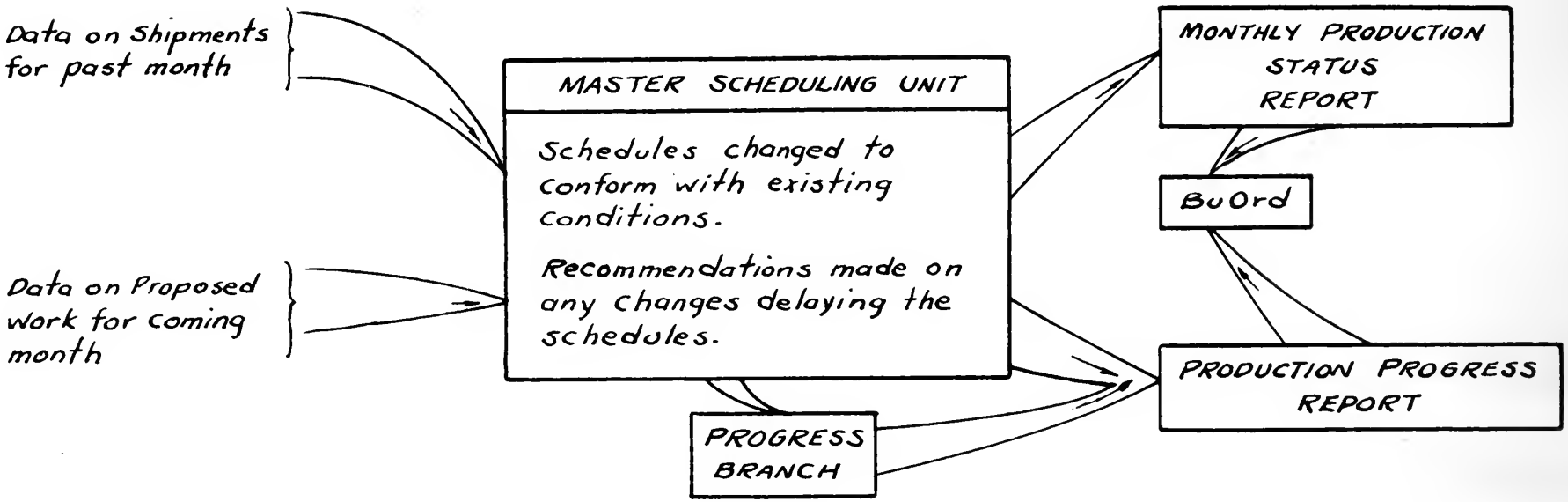
Compiled Weekly.

In Report Form

MANAGEMENT

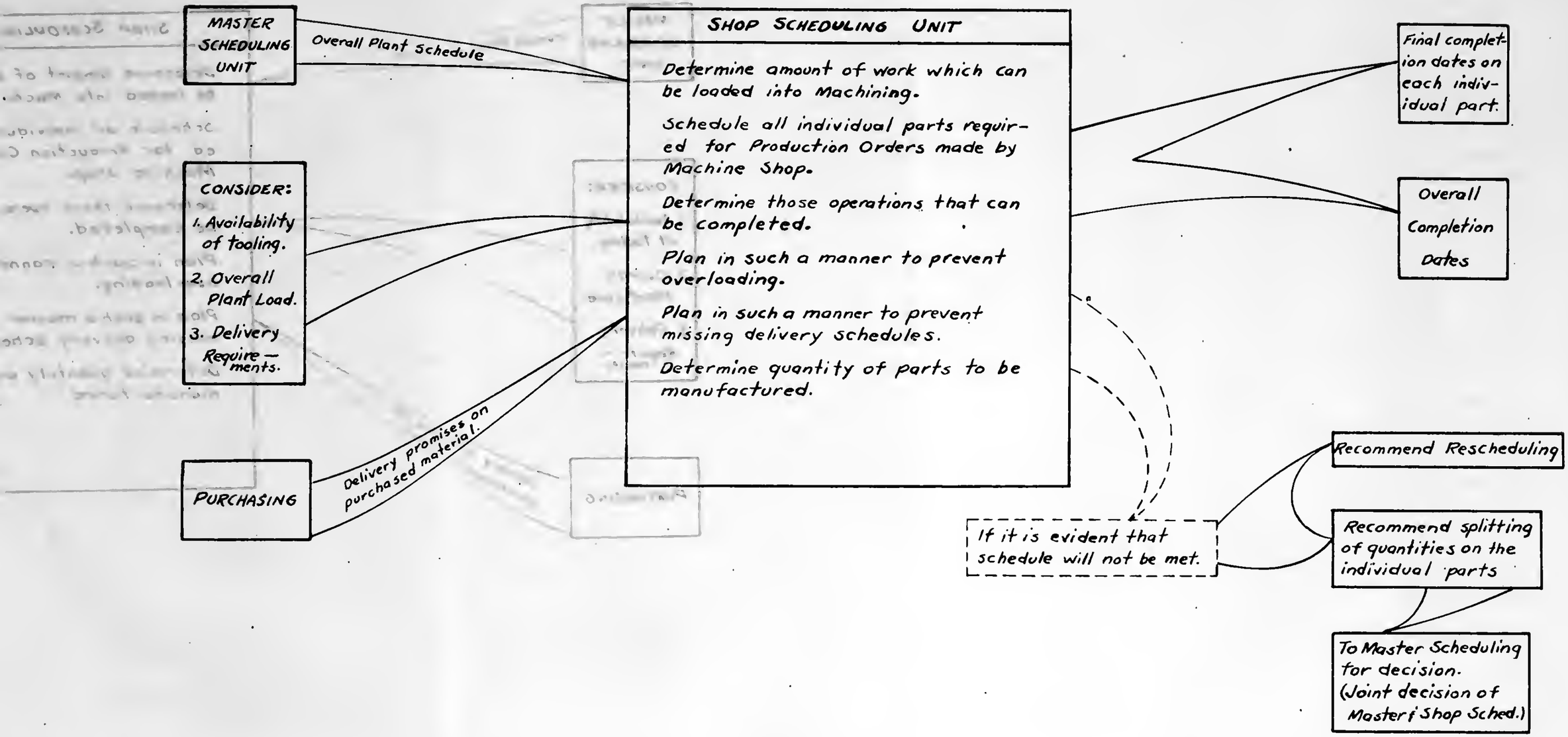
BuOrd

MACHINING & ASSEMBLY, MAN-LOAD & PERFORMANCE



REPORT of PRODUCTION PROGRESS

SHOP SCHEDULING UNIT



MACHINE SHOP SCHEDULING

PRODUCTION SCHEDULE

PRODUCTION PROGRESS REPORT

Reflect BuOrd Requirements & Final Schedules

SHOP SCHEDULING UNIT

Must Analyze:

Limiting raw materials.

Machine tool requirements & availability.

Finished parts requirements. (purchased)

Assembly fixtures required & availability.

Assembly space required & available.

Amount of work which can be loaded.

Schedule of all individual parts to be made by Assembly.

Operations that can be completed.

Factors tending to cause overloading.

Delivery schedules.

Personnel required & available.

Review of monthly schedule in order to determine which Job Orders can be rescheduled, and which schedules can be maintained.

To advise Assembly

Six month's projected Schedule issued each month on all major projects.

CURRENT MONTH'S SCHEDULE
Outlines the work to be completed during current month.

If pre-planned schedules cannot be met.

Normal situation

For confirmation, or further instructions.

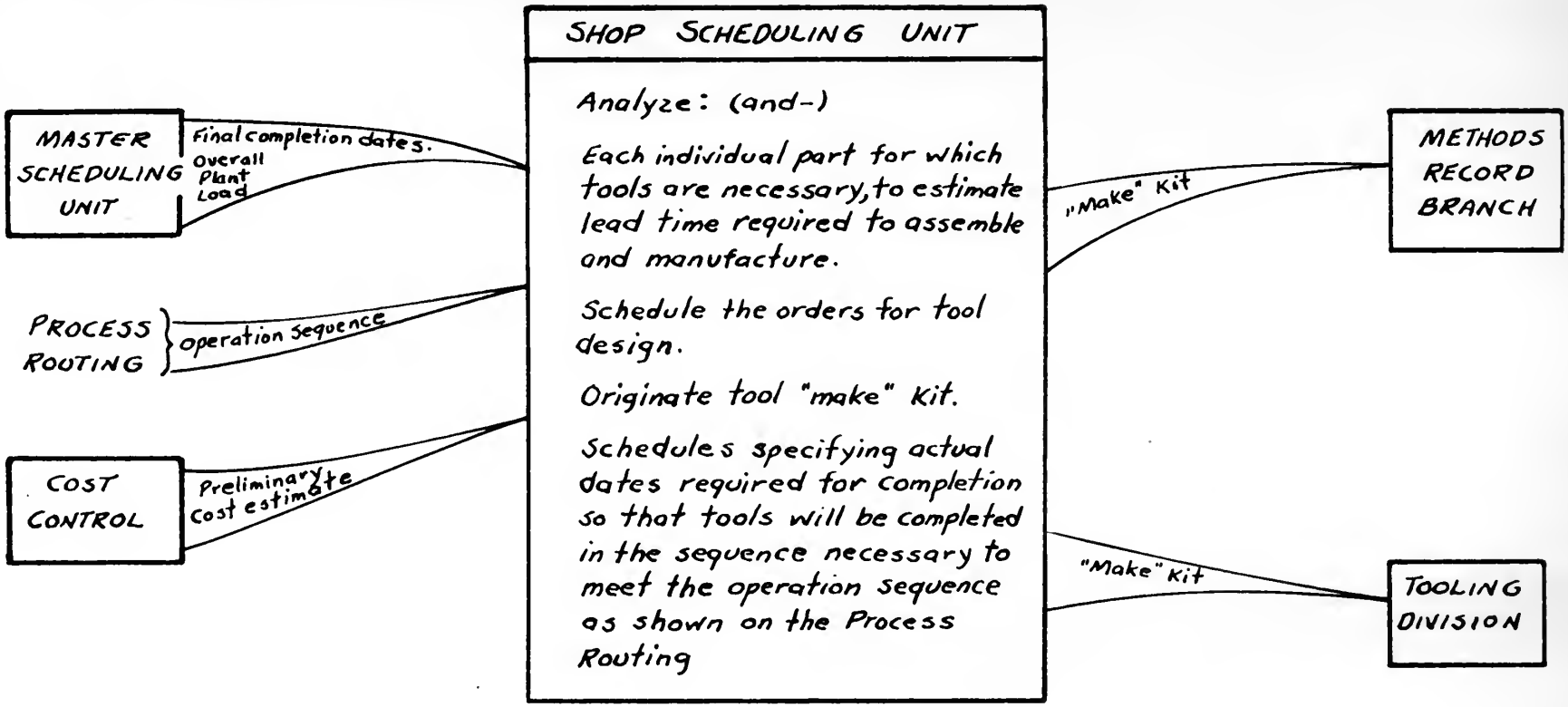
MASTER SCHEDULING UNIT

Schedules firm, or rescheduled

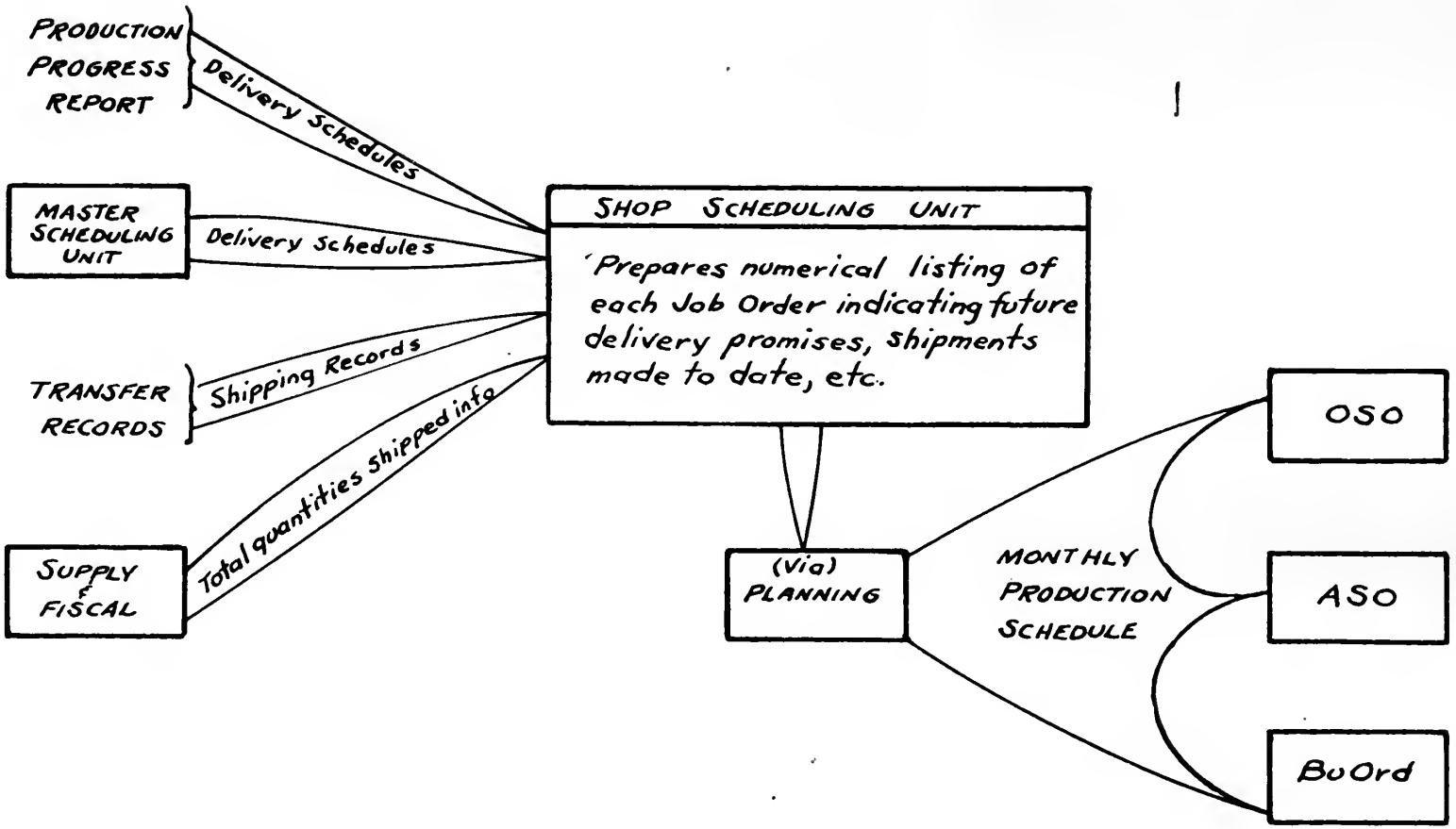
Distribution

PLANNING

ASSEMBLY SCHEDULING

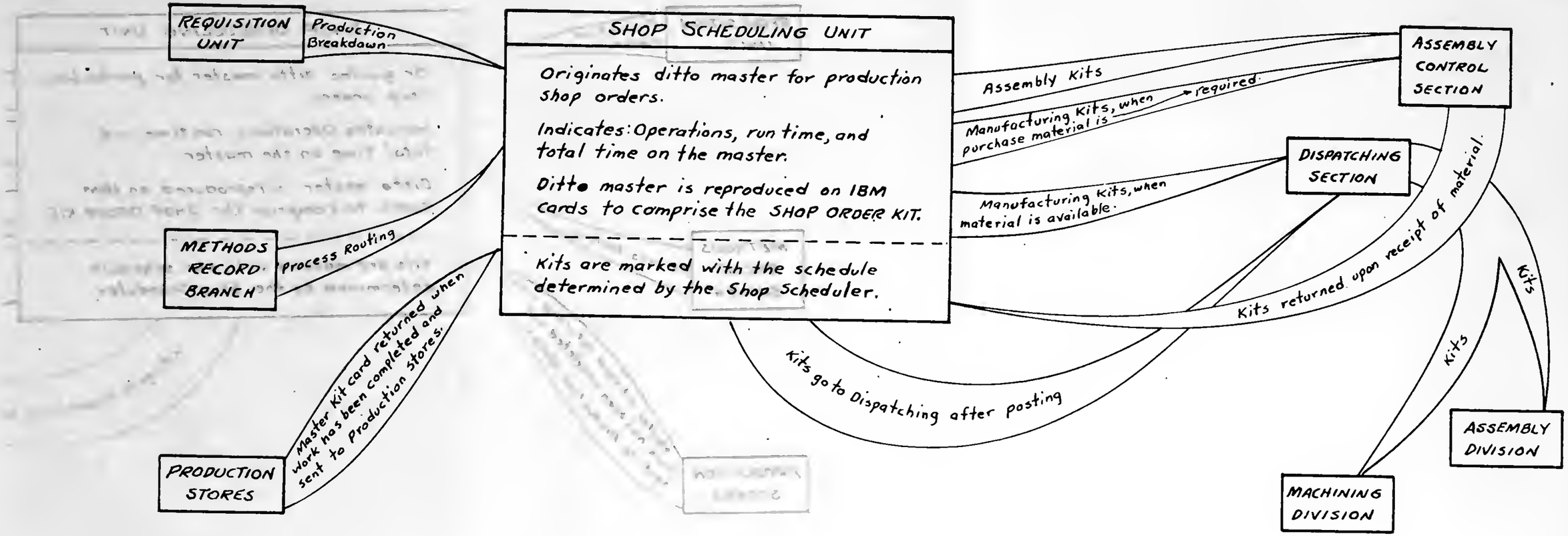


TOOLING SCHEDULING

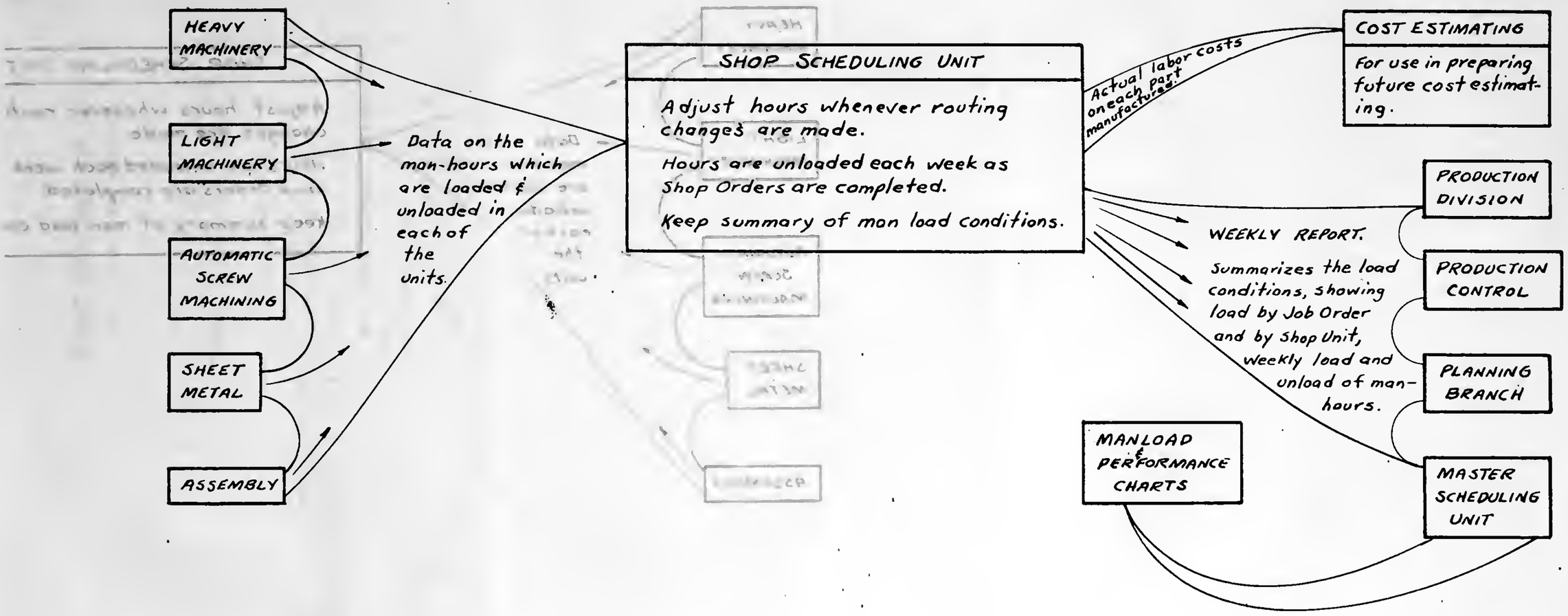


MONTHLY PRODUCTION SCHEDULE

SHOP SCHEDULING UNIT



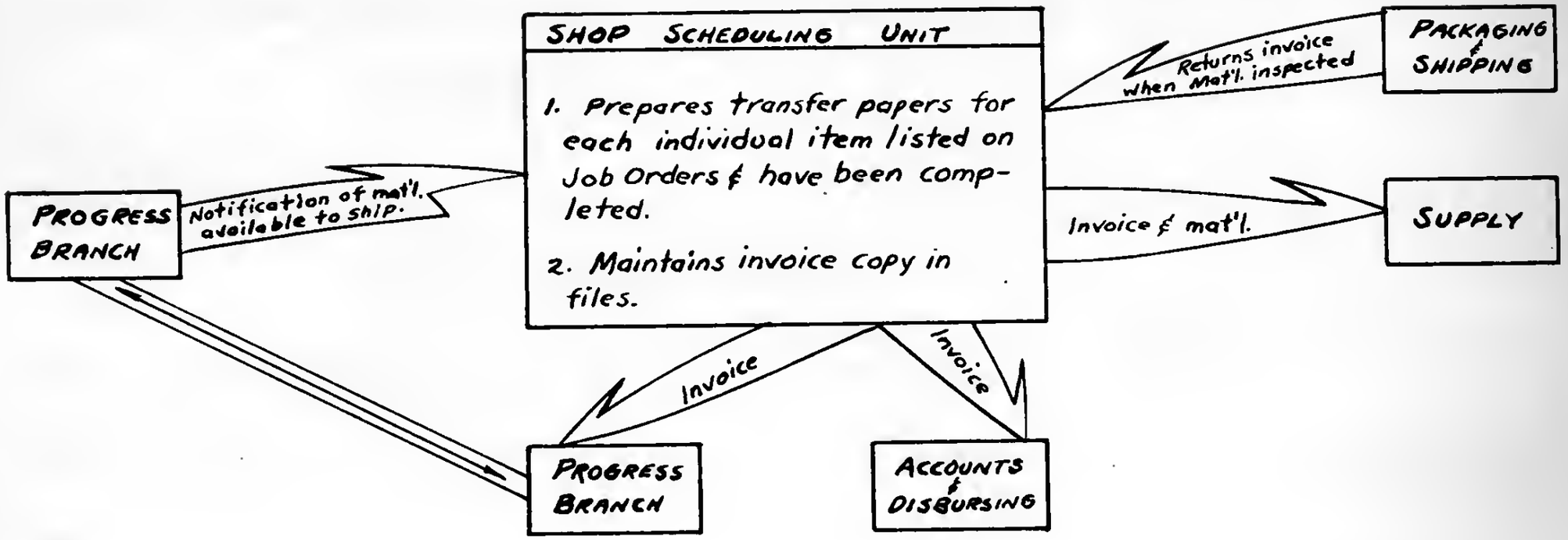
SHOP ORDERS



MAN-HOUR CONTROL

SHOP SCHEDULING UNIT

RELIEF OF CUSTODY



U. S. NAVAL ORDANCE PLANT INDIANAPOLIS

INDUSTRIAL DEPARTMENT SCHEDULE

DESCRIPTION _____

_____

_____

ORIGINATING DATE _____

EXPIRATION DATE _____

JOB ORDER _____

P. O. ALLOT NO. _____

REVISION NO. _____

PRELIMINARY ENGINEERING RELEASE DATE

FINAL ENGINEERING RELEASE DATE

YEAR																											TOTAL HOURS
MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
MACHINING DIV COST CENTER #22 HOURS																															
ASSEMBLY DIV COST CENTER #23 HOURS																															
TOOLING DIV COST CENTER #24 HOURS																															
DELIVERY SCHEDULE																															

REMARKS _____

_____

_____

SIGNED _____

DATE _____

DNP-IOOP-4501 3-18

SHOP ORDER NO. 1-32000

MATERIAL TO BE USED ON THIS ORDER: ST. STL - 416

3/16 x 3 FLAT

GENERAL INFO: 42-46 - 3313-100-120 - HPR

CODE 3C

PART NO. 742997A

AMT. ORDER 22

NAME COUPLING

EST. UNIT HRS. 2.23 - 4

	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
	268	2.1													421	222	267	
S	.1	.15	2.0	2.0	1.5	1.5	2.0	1.0	-	1.0	2.0	1.5	3.5			D		
P	.25	4'	2.5	2.5	2.5	3.3	5.0	6.60	7.0	2.5	5.0	8.3	20.5	3.3				
	93	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180
			→	→	→	SAMPLE						←	←					
S																		
P																		

SHOP ORDER MASTER — ONH-NOP-430 (REV. 8-64) H-45 — Navy—DPFO ONP, Great Lake

OR ASSEMBLY NUMBER	PROD. ORDER NO.	SHOP ORDER NO.

ASSEMBLY NAME

OD PIECES		REJECTS		OPER. NO.	SHIFT	DATE
INAL	PARTIAL	SCRAP	REPAIR	INSP. NO.		

STORES RECORD

	ENTERED PROD. CONTROL	
	ENTERED COST	

IBM 137284

CROP ORDER NO. L-32006

MATERIAL -- SIZE & SPEC. ST. STL. 301

GENERAL INFO.

CODE

PART NO. 442 3914

ANT. ORDER

DUE

EST. UNIT HRS.

CROP ORDER MASTER

Delivery Time & Date	Quantity	Unit	Unit Price	Extention

Deliver To

Issued By	Date	Rec'd. By	Date	Del. & Chg. as Indicated	1

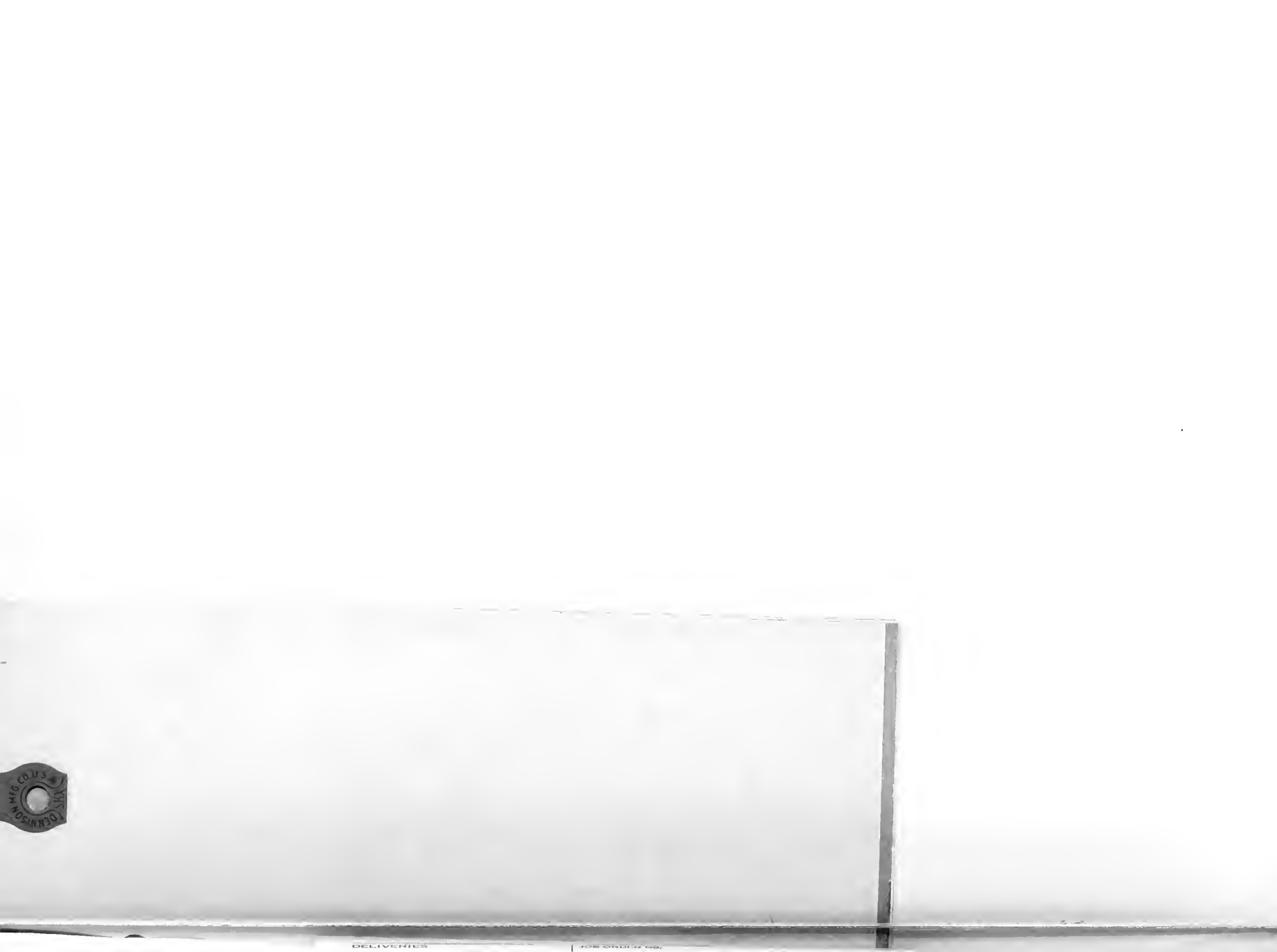
INDEX

ORDER NO. 1-32000	MATERIAL -- SIZE OF STOCK ST- SI- 116 3/16 x 3 3/8	
	GENERAL INFO. 64-46-3--3513-100-120 APN	CODE 30
NO. 742397A	ARMY ORDER 32	NAME CONTAINS EST. UNIT HRS. 223-31

Time & Date	Quantity	Unit	Unit Price	Extensio
To				

Rec'd. By	Date	Rec'd. By	Date	Del. & Chg. as Indicated

3


DENNISON MFG CO. U.S.A.
DELIVERIES
JOB ORDER NO.

NAVY DEPARTMENT NAVSANDA FORM 155 (Rev. May 1948) — RECEIPTS FROM MANUFACTURING

MEMORANDUM INVOICE INTO STORE

DELIVERIES ☐ PARTIAL ☐ COMPLETE
DELIVERED FROM SHOP

JOB ORDER No.

ACTIVITY

INVOICE No.

NSA
APA
SMA

TO

DATE

FOR SHIPS OR OBJECT

RECORD No.

PRICED BY

MFG. REQ. No.

SHIPS' REQ'N—SHIPMENT REQ.

INSPECTED BY

J. O. ITEM NO.	STOCK No.	DESCRIPTION OF ARTICLE	UNIT	QUANTITY	UNIT PRICE	EXTENSION	
					TOTAL		

RECEIVED THE ABOVE ARTICLES:

DATE

SIGNATURE

☆ U. S. GOVERNMENT PRINTING OFFICE 16—48219-1

WEEKLY MAN LOAD SUMMARY
N-660

P.J.O.	TOTAL HOURS ASS'G'D	ASS'G'D DURING WEEK	TOTAL COMP TO DATE	HOURS COMPLETED 1 WEEK				U.H. = UNSCHEDULED HOURS: S.H. = SCHEDULED HOURS							
				D/221	D/223 D/225	D/225	TOTAL	D/221		D/223 D/225		D/224		TOTAL	TOTAL
								U.H.	S.H.	U.H.	S.H.	U.H.	S.H.	U.H.	S.H.

...KLY ASSEMBLY MAN LOAD SUMMARY
...ol

...6	M 333 Estimated Hours	Actual Hours Completed		...ished		ESTIMATED HOURS ...ed			
		Week	Total	Week	Total	Total	Remaining Load Hours Unscheduled	Scheduled	Total

NOMENCLATURE

TYPE OF WITHDRAWAL

WITHDRAW PART NO

DATE	STUB NO	Quantity Supplied	[illegible]	[illegible]	[illegible]	[illegible]

JOB ORDER _____

Since all transfers have been receipted, the subject job may be closed when signatures have been affixed to the following check list of close-out operations.
Please sign and forward to the applicable Section or Branch controlling the function outlined.

TO: PLANNING BRANCH

SCHEDULING SECTION

All transfers receipted. Date _____ Initial _____

All Production Shop Orders completed. Date _____ Initial _____

All Tooling Shop Orders completed. Date _____ Initial _____

STORES SECTION

All surplus material disposed of. Date _____ Initial _____

APPROVED

Date _____ Initial _____
Head, Planning Branch

TO: PROGRESS BRANCH

EXPEDITING SECTION

All Stub Requisitions completed. Date _____ Initial _____

APPROVED

Date _____ Initial _____
Head, Progress Branch

TO: TOOLING DIVISION

TOOLING DIVISION

Shop 242 - All Stub Requisitions Completed. Date _____ Initial _____

Shop 244 - All Stub Requisitions Completed. Date _____ Initial _____

Division 240 - All Stubs Completed. Date _____ Initial _____

APPROVED

Date _____ Initial _____

PACKING SECTION

All Packaging Completed. Date _____ Initial _____

FORWARD TO DONALD D. DENNIS
HEAD, INDUSTRIAL CONTROL DIVISION

PRODUCTION SCHEDULE

PAGE

JORD OJECT RDER	BUORD PROCM'T REQUEST	OSO REQUEST NO.	PLANT JOB ORDER	D' P.	TOTAL SHIPPED TO DATE	TRANS. THIS MONTH	BAL. DUE	REI

NAVAL ORDNANCE PLANT, INDIANAPOLIS, INDIANA

Report Symbol BuOrd 4650-3

PRODUCTION SCHEDULE

DATE _____

PAGE _____ OF _____

BUORD PROJECT ORDER	BUORD PROCM'T REQUEST	OSO REQUEST NO.	PLANT JOB ORDER	DRAWING & PIECE NO.	DESCRIPTION	REQ. COMP. DATE	TOTAL ORDER	TOTAL COMPLETED TO DATE	ESTIMATED SCHEDULE						% CPL.	TOTAL SHIPPED TO DATE	TRANS. THIS MONTH	BAL. DUE	REMARKS

MACHINE LOAD DATA
9ND-NOP-1826 (Rev. 12-55)

SHOP ORDER	HOURS		TOTAL	REMAINING LOAD			
NUMBER	ASGD.	COMP.	COMP.	D/221	D/224	D/225	TOTAL

NAVY--DPPO 9ND, GREAT LAKES, ILL.

Part IV

MACHINE LOAD DATA
9ND-NOP-1826 (Rev. 12-55)

SHOP ORDER	HOURS		TOTAL	REMAINING LOAD			
NUMBER	ASGD.	COMP.	COMP.	D/221	D/224	D/225	TOTAL

NAVY--DPPO 9NO, GREAT LAKES, ILL.

23-280
4780 SI
Colored Tabs

23-281
4781 SI
Clear Tabs

MADE IN U. S. A.

NATIONAL INSERTABLE-TAB INDEXES ENABLE YOU TO MAKE YOUR OWN SUBJECT ARRANGEMENT, USING PLAIN INSERTS ON WHICH TO WRITE YOUR OWN CAPTIONS.

Part IV

PART IV

MATERIAL HANDLING PROCEDURES AND ANALYSIS

In any industrial situation, there are four criteria that provide a yardstick by which one may measure the extent to which the organization is functioning properly and by which the efficiency and effectiveness of the production control system may be determined. These four criteria are:

1. Standard of Performance
2. Actual Performance
3. Variance of Performance
4. Management Decision and Action based on direction and magnitude of variance.

This section presents the duties and responsibilities of the Production Control Division (D/260) as delegated to the Material Control Section (D-265) of the Planning Branch (D/261) and the Progress Branch (D/269). This narrative with the accompanying charts IV 1-7, illustrate the procedures used at NOPI by indicating the type and quantity of information that passes from one functional group to the next as a result of the acceptance of a proposal and the receipt of a project authorization.

A. Material Control Section (D/265)

The Material Control Section is, in itself, a small management group. Its main function is to coordinate the operations of the three units under its command. As coordinator, it is called upon to render such decisions as may be required to solve any problems arising from the

third criterion, variance of performance. As a result of this position, there is a constant flow of informal information into and from this office which is highly critical to the meeting of production schedules wherein the availability of materials and/or parts is concerned.

A more complete understanding of the responsibilities of the Material Control Section can be obtained through the explanation and illustration of the procedures and methods used to fulfill the standard of performance.

1. Requisition Unit (D/266)

The requisition unit is perhaps the most important or at least does a greater volume of information handling than any of the other units presented in this section. Reference to Chart IV-1 and following this narration provides a typical picture of the red tape necessary to provide satisfactory production control.

The first concrete action, taken by this section on a job order is initiated upon receipt of the List of Drawings, Sub-Assemblies and Parts from the Methods Records Branch (D/264). From this list, two steps are taken. First, the information is transferred to a form known as Firm Requirement and Obligation of Material, hereafter known as the Material Screening Form. The purpose of material screening is to determine the availability of materials. Hence it is sent to the Production Stores (wire-crib) if wire and/or sleeving is required. The Wire Crib screens for the wire requirements and obligates available wire to the listed job number, files one copy and returns the remaining (3)

copies to the Requisition Unit. Wire deficiencies are noted and the appropriate Stub Requisitions are initiated to fulfill the requirements. Meanwhile the receipt of the Material Screening Form produces a search by the Supply Department to determine what materials and parts are available in the supply system and indicates any Casualtyitems, and the obligation of parts and materials available. When such Casualty items exist, the Materials and Standards Branch and Methods Records Branch are informed and jointly discuss and approve or make further recommendations. Upon completion of this initial screening process the Cost Estimating Branch is notified of the final results.

During the above procedure, material requirement specialists have taken the second step in the sequence. They have made a production breakdown from the List of Drawings, Sub-assemblies and Parts. This breakdown provides the Supply Branch (612) with the task of screening for all listed raw materials and obligating those available. Here again, Supply can make material substitution offers which in turn are reviewed and approved or changed by Engineering (913) and the Machine Tool Processing Branch (D/251). The Requisition Unit reviews the breakdown and determines whether to make or buy unavailable parts. Supply must then screen for and, if available, obligate raw materials for make-parts. With this phase completed, the materials and parts are requisitioned through the Supply Department on the appropriate forms depending on date required. All requisitions

pertaining to bearings are referred to Materials and Standards Branch (913), mouldings and castings are referred to Machine Tool Processing, and to all items are priced by Cost Estimating Branch (D/253). Requisition Unit records information and Supply then procures the material so requisitioned. This completes the first phase of material control, that of initiating the procurement.

The second phase controlled by the Requisition Unit is that of preparing for receipt of the ordered materials or parts. From the Production Breakdown, three types of Stock Record Cards are prepared. The first, yellow in color, indicates assemblies; the second, white and four copies, indicates machine tool parts; and the last, white and two copies, indicates commercial and available parts. The copies are sent to the appropriate personnel with the originals of all three going to Assembly Control Section (D/272). It is on these originals that the status of available and ordered parts is kept. Coinciding with the screening process, the Master Scheduling Section (D/263) disseminates the Internal Schedule for Production Control indicating the due dates of the various control items and production requirements. This schedule sets the pace and provides for coordination of operations. As in many industrial facilities, producing new designs, there are numerous changes made even before the first part has been assembled. These changes come to the Requisition Unit for incorporation in the product and results in sporadic repetition of the initial procurement pro-

cedures. These changes often require material substitutions as before and results in the origination of the Raw Material Substitution Order to accompany previously completed control components. This order is disseminated through the Manufacturing Methods Division and Shop Scheduling Unit.

The third and final phase of procurement control is that of follow-up once the material and parts commence to arrive. The part played in this phase by the Requisition Unit is primarily of a passive nature until such time as the job is finished, cancelled or otherwise disposed of, producing excess materials or parts under obligation. The passive action consists of being the recipient of a Purchased Parts Shortage List and a Shop Parts Shortage List from the Progress Branch. These are filed for future reference. At the termination of production activities on the specific job order, Stock Control is requested to furnish a listing of materials available and obligated in NIF inventory for this job order so that the disposition of materials may be determined, and to release from obligation all obligated materials other than NIF-NOP and NIF. When the disposition of the materials and parts in NIF Inventory has been determined, the Stock Control Branch is directed to change the indicated job orders and relieve the obligations. The main responsibilities of the Requisition Unit are terminated with this disposition.of materials and/or parts.

2. Production Stores Unit (D/267)

Next in line under the Material Control Section is the Pro-

CHART IV-1

MATERIAL CONTROL SECTION
D/265

MANUFACTURING METHODS DIVISION (D/250)
(1) List of Drawings, Sub-Assemblies and Parts [254]
(2) Material Screening [Casualty Items Approved] [254]
(1) Estimate of Man Hours & Costs [253]
(9) Stub Requisition [Returning after pricing] [253]
(8) Stub Requisition [Credit] [Returning after posting] [253]

PRODUCTION STORES (Wire Crib) (D/267)
(3) Material Screening [Wire needs]

MASTER SCHEDULING UNIT (D/263)
(1) Internal Schedule For Production Control

SUPPLY DEPARTMENT (600)
(3) Material Screening [612]
(1) Production Breakdown [612]
(1) Mat'l & Parts - Obligation relief of [644]
(1) Memo - Obligation: relief of [644]

PRODUCTION STORES (WIRE CRIB) (D/267)
(4) Material Screening
(8) Stub Requisition [Credit]

METHODS RECORDS BRANCH (D/254)
ENGINEERING CONSULTANT
(2) Material Screening

COST ESTIMATING BRANCH (D/253)
(1) Estimate Man Hrs. & Costs
(1) Material Screening
(9) Stub Requisition
(8) Stub Requisition [Credit]

SUPPLY DEPARTMENT - BRANCH (612)
(2) Material Screening [Completed]
(1) Production Breakdown [After screening and reserving parts available]
(1) Production Breakdown [For decision make or buy]
(1) Production Breakdown [After screening for raw material and reserving raw material available]
(1) Production Breakdown [After final reservation and daily status]

REQUISITION UNIT (D/266)
Originates
(4) Material Screening Form
(1) Production Breakdown
(4) Stock Record Card [Machine Tool Parts]
(4) Stock Record Card [Manuf. Assemblies]
(2) Stock Record Card [Commercial & Available Parts]
(9) Stub Requisitions [Use within 30 days]
(9) Stub Requisition [Use after 30 days] [PR. VQ]
(3) Raw Material Substitution Order
(1) Memorandum - Obligation: relief of
(2) Materials and Parts in NIF - Obligation relieved of
(9) Stub Requisition [Credit]

COST CONTROL (D/210)
(1) Material & Parts in N.I.F. [Obligation: relief of]

MANUFACTURING METHODS (D/250)
(3) Raw Material Substitution Order

SHOP SCHEDULING UNIT (D/264)
(2) Raw Material Substitution Order

STOCK CONTROL (644)
(9) Stub Requisition

MACH. TOOL PROCESSING (D/251)
(1) Production Breakdown [Mat'l Subst.]
(9) Stub Requisition [Casting or Moulding]

ENGINEERING DEPARTMENT (913)
(1) Production Breakdown [Mat'l. Subst.]
(9) Stub Requisition [Bearing Infor.]

ENGINEERING DEPARTMENT (800)
Engineering Change Orders
Engineering Technical Letters
Authorized Deviations
(9) Stub Requisition [With bearing information]
(3) Raw Material Substitution Order [Approved]
(1) Production Breakdown [Material Substitution]

ASSEMBLY CONTROL SECTION (D/272)
(1) Purchased Parts Shortage List
(1) Shop Parts Shortage List

Engineering Change Orders -
Engineering Technical Letters -
Authorized Deviations -
Internal Schedule For Production Control

TO ALL CONCERNED

MANUFACTURING METHODS (D/250)
(1) Stock Record Card [Mach. Tool]
(1) Stock Record Card [Manuf. Ass'y]

SCHEDULING SECTION (D/262)
(1) Stock Record Card [Mach. Tool]
(1) Stock Record Card [Manuf. Ass'y]

ASSEMBLY CONTROL SECTION (D/272)
(1) Stock Record Card [Mach. Tool Orig.]
(1) Stock Record Card [Manuf Ass'y Orig.]
(1) Stock Record Card [Commercial Orig.]

duction Stores Unit, also called Finished Stores. Its function is to receive and store all parts manufactured by NOPI until such time as they are called for by the Assembly Control Section (D/272). Under its cognizance is the Wire Crib and its related activities, which are included in Chart IV-2, which provide the same services whenever wire or sleeving is required by the assembly functions. The Production Stores Unit is the first unit in this section to come in actual contact with the materials or parts. Again, the three phases of the procurement cycle will be explained and are illustrated on Chart IV-2. As indicated, a major portion of the information utilized by this unit is of an internal nature. Such information as location of parts stored, provisions for change of location, and receipts for temporary custody of parts are indicated.

The Production Stores Unit commences its first contribution for the initial phase of procurement control upon receiving the request to screen for wire availability and obligation from the Requisition Unit. Upon completion of this function the information is sent to the Requisition Unit where proper action is taken to procure the types and amounts not available. This is the only contribution in the initial phase of material procurement.

The follow-up and completion phases are practically one continuous phase since parts come into storage as they are completed. From time to time the Progress Branch sends the required Memo Invoice into Stores as information from the Manufacturing Division,

through Scheduling, as to the status of the job order of the delivered parts. This information is forwarded on to the Inspection function. As parts come in to the Production Stores area, they are accompanied by several parts of the Shop Kit. With the part, comes the Master card on which has been indicated the machining and labor hours required for the part as required under the NIF system. Also, with the part comes a Kit "Greenie" containing inked-in entries and indicating the routing of the part. This comes through the Inspection function as does the Shop Kit "Pinkie" that serves to identify excess materials or parts. The ordered parts are identified by a Shop Kit Identification Card that is tied to the part or its container. Inspection also forwards the two remaining copies of the Raw Material Substitution Order which are destroyed by Production Stores after review. When Assembly Control needs a part, it uses a Shop Kit Green Card with the ordering clerks initials, as a local stub requisition. The Greenie is then returned to the issuing clerk with the part so ordered. The card is so marked as to provide the amount issued and balance. During the process, any excess parts or materials are listed on the Stub Requisition (Credit Memo) and the stub and parts are sent to Inspection. The remaining action on a job order taken by the Production Stores Unit is to date and initial the Close-Out Approval signifying that all surplus material has been disposed of.

CHART IV-2

MATERIAL CONTROL SECTION
D/265

MACHINING DIVISION (D/220)
(1) Shop Kit Master Card [Mach. & Ass'y Hrs.]

SCHEDULING SECTION (D/262)
(1) Close-Out Approval

REQUISITION UNIT (D/266)
(4) Material Screening [Wire Crib]

PROGRESS BRANCH (D/269)
(5) Memo Invoice Into Stores [cp. 5-9]

PRODUCTION DISPATCHING (D/271)
(1) Shop Kit [Identification Card]

ASSEMBLY CONTROL SECTION (D/272)
(1) Shop Kit [Green Card - Local Requisition]

INSPECTION DEPARTMENT (421-422)
(1) Shop Kit [Pink Card - Excess Mat'l]
(1) Shop Kit [Green Card - NOPI Parts]
(2) Raw Material Substitution Order

PRODUCTION STORES UNIT (D/267)
OR FINISHED STORES UNIT

Originates
(9) Stub Requisition [Credit]
(1) Supplement Form to Stub Requisition if Required
(1) Parts Location Change
(1) Employee Custody Sheet
(1) Stores Quantity Record or Bin Card
(1) Locator File Card
(1) Stock Record Card
(1) Obligation Card

SHOP SCHEDULING UNIT (D/264)
(1) Shop Kit [Master Card]

REQUISITION UNIT (D/266)
(3) Material Screening [Wire Req'm'ts]

ASSEMBLY CONTROL SECTION (D/272)
(1) Shop Kit [Green Card - Local Requisition]

EXPEDITING SECTION (D/273)
(1) Close-Out Approval

INSPECTION DEPARTMENT (421)
(8) Stub Requisition [Credit]
(5) Memo Invoice Into Stores [cp. 5-9]

3. Bar Stock Unit (D/268)

The function of this unit is to store semi-finished parts and act as issuing facility for miscellaneous material handling equipment or containers. This unit is more commonly referred to as the Impounded or Semi-Finished Stock Unit. The parts usually sent to this unit are those which having been partially completed, have been ordered held up until further notice. In carrying out this function it contributes little to production control efforts. It does supply trays, etc. for small parts in process which is entirely a supporting activity. The semi-finished or impounded parts are brought in under a Memo Invoice into Stores and held until further disposition is advised by the Production Dispatching Section. See Chart IV-3.

This completes the responsibilites of the Material Control Section as it provides the material procurement, follow-up and disposition of the product through the Planning Branch of production control cycle.

CHART IV-3

MATERIAL CONTROL SECTION
D/265

PROGRESS BRANCH (D/269)
(3) Memo Invoice Into Stores

PRODUCTION DISPATCHING SECTION (D/271)
(1) Shop Kit [Green Card - Local Requisition]

BAR STOCK UNIT (D/268)
IMPOUNDED OR SEMI-FINISHED STOCK
Originates
(3) Miscellaneous Materials and Supplies
(1) Stock Record Card
(1) Obligation Card

MACHINING OR ASSEMBLY DIVISION (D/220/230)
(1) Shop Kit [Green Card With Part]
(1) Miscellaneous Materials and Supplies

METHODS RECORDS BRANCH (D/254)
(1) Miscellaneous Materials and Supplies [Orig.]

B. Progress Branch (D/269)

Attention is now focused upon the second branch of the Production Control Division whose primary responsibility is to keep account of the production progress or status and to take such action as is necessary to meet proposed schedules. While the Progress Branch has cognizance over its three sections, it does have a more active part in the branch function than has the Material Control Section. Here, the standards of performance are the proposed schedules, the actual performance is measured by the ability to meet the proposed schedules, and the variance is the difference between the proposed and actual dates of completion. When a variance is present, this branch must take remedial action or inform interested parties of the required change.

Chart IV-4 illustrates the function of the actual Progress Branch. It is apparent that its main duties consist of overseeing the production progress and material procurement progress through such representative informational sources as the Master Progress Schedule, the Purchased Parts Shortage List, and the Notice of Availability of obligated material. It does, however, direct material into the Production Stores and Semi-Finished Stock Units by dissemination of the Invoice into Stores Memos. It also verifies the close-out Approval before forwarding it to the Tooling Division.

1. Production Dispatching Section (D/271)

The very nerve center of the Progress Branch for controlling machined parts production is located in this section. Its function

CHART IV-4

PROGRESS BRANCH D/269

METHODS RECORDS BRANCH (D/264)
(1) Job Order
(1) Cost Estimate
(1) Cost Schedule

SCHEDULING SECTION (D/262)
(5) Memo Invoice Into Stores [Copies 5-9]
(3) Memo Invoice Into Stores [Semi-Finished]
(1) Master Progress Schedule

ASSEMBLY CONTROL SECTION (D/272)
(1) Purchased Parts Shortage List

EXPEDITING SECTION (D/273)
(1) Close-Out Approval

STOCK CONTROL BRANCH (644)
(1) Notice of Availability of Obligated Mat'l

PROGRESS BRANCH (D/269)
Files For Reference
(1) Job Order
(1) Cost Estimate
(1) Cost Schedule
(1) Purchased Parts Shortage List

TOOLING DIVISION (D/240)
(1) Close-Out Approval

PRODUCTION STORES (D/267)
(5) Memo Invoice Into Stores [Copies 5-9

SEMI-FINISHED STOCK UNIT (D/268)
(3) Memo Invoice Into Stores

EXPEDITING SECTION (D/273)
(1) Master Progress Schedule

is the coordination of the activities of the material procurement and the use of the materials in the making of the parts required. This section's standard of performance is to have the parts machined and ready for assembly at the proposed date deadline. It then, must see to it that the foremen of the Machining Division so schedule the work to their shops that the machine parts reach assembly on the desired date. If there is any variance that cannot be corrected, production will again be slowed down. The prime tool used in routing and scheduling control is the Shop Kit. The Production Dispatching Section is the keeper of the kits. A kit for each part to be made is received from Shop Scheduling when material is available. One-half of the kit is kept on the kit board and the other half is given to the foreman with the drawings and routing. The supporting function of this section is to deliver materials and parts to their destination. When the machinist reports for his routing and drawings, the material is waiting to be delivered to his work station. Similar procedure is followed for rework materials. Upon the receipt of the Shop Kit (Assembly) signifying availability of parts, the Kit is split. The top half goes to the Assembly Division with routings and drawings, while the last half is sent to the Assembly Control Section kit board, transferring that phase of production control.

The follow-up function of the Dispatching Section consists of including the Raw Material Substitution Order in the Shop Kit concerned and seeing that the substituted material is on hand,

CHART IV-5

PROGRESS BRANCH
D/269

METHODS RECORDS SECTION (D/254)
(2) Process Routing
(2) Process Routing, Changes and Drawings

SHOP SCHEDULING SECTION (D/264)
(32) Shop Kit [If and When Material Available]
(32) Shop Kit [Rework Parts]
(2) Raw Material Substitution Order

ASSEMBLY CONTROL SECTION (D/272)
(1) Shop Parts Shortage List

INSPECTION DEPARTMENT (421)
(1) Shop Kit [Buff Card - Completion]
(1) [Brown Card - Tool Disposition]
(1) [Blue Card - Machine Load Completion]
(1) [Cream Card - Identification]
(1) [Green Card - Cancellation]
(1) [White Card - Completion]

PRODUCTION DISPATCHING SECTION (D/271)
Originates
(1) Shop Kit [Back of White Card When Job Completed]
(1) Shop Kit [Green Card - Cancel Funds and Material Obligations]

Files
(16) Shop Kit [NOPI Manufactured Parts]
(1) Shop Parts Shortage List
(1) Shop Kit [Buff Card - Indicating Completion of Job]
(2) Process Routings - Changes and Drawings

MACHINING OR ASSEMBLY DIVISION (D/220/230)
Drawings [As Required]
(2) Raw Material Substitution Order
(16) Shop Kit [Manufactured Parts]
(16) Shop Kit [Rework Material]
(16) Shop Kit [For Assembly of Parts]

TOOLING DIVISION (D/240)
(1) Shop Kit [Brown Card - Tool Disposition]

SHOP SCHEDULING SECTION (D/264)
(1) Shop Kit [Blue Card - Mach. Load Complete]

PRODUCTION STORES UNIT (D/267)
(1) Shop Kit [Cream Card - Identification]

ASSEMBLY CONTROL SECTION (D/272)
(16) Shop Kit [For Assembly Control]

EXPEDITING SECTION (D/273)
(1) Shop Kit [White Card - Completion]

STOCK CONTROL BRANCH (644)
(1) Shop Kit [Green Card - Cancel Funds, etc.]

and that routing changes are incorporated.

The completion duties are more extensive. They consist of notifying the Tooling Division of the job completion for proper tool disposition, notifying Shop Scheduling Section of job completion, sending the part and Kit Identification Card to Production Stores when completed, and notifying the Stock Control Branch to cancel funds and material obligations. All these functions are done using a Shop Kit card of specified color. See Chart IV-5. As for example, the white card is sent to the Expediting Section for information transfer and then is destroyed. With the added responsibility of providing the delivery and pick-up between all areas of the production facility; it is clear that Production Dispatching is a major nerve center of the plant.

2. Assembly Control Section (D/272)

This section is to the Assembly Division what the Production Dispatching Section is to the Machining Division. Its primary function and standard of performance is to coordinate the availability of parts with the Assembly Shop schedules. This section is the part procurement agency for the Assembly Division. Parts are ordered in two ways: NOPI or manufactured parts are requisitioned from Production Stores by using a Shop Kit Greenie with the assembly control clerks initials thereon. Parts are ordered from Supply by using the Short Stub Requisition.

The Assembly Control Section also has a hand in the procurement of material. It maintains the stock record cards and

CHART IV-6

PROGRESS BRANCH
D/269

SCHEDULING SECTION (D/262)
(1) Projected Assembly Schedule

SHOP SCHEDULING UNIT (D/264)
(2) Raw Material Substitution Order [With Shop Kit]
(8) Stub Requisition [Credit - Relief of Custody]
(32) Shop Kit [For Assemblies-Mach. Tool & Commercial Parts]

PRODUCTION DISPATCHING SECTION (D/271)
(16) Shop Kit [For Assemblies]

REQUISITION UNIT (D/266)
(1) Shop Kit [Master Card - For Posting]
(1) Stock Record Card [Assemblies-Mach. Tool and Commercial Parts]

PRODUCTION STORES OR BAR STOCK UNIT (D/267/268)
(1) Shop Kit [Green Card - Local Requisition]

RECEIPT CONTROL BRANCH (642)
(4) Purchased Parts Shortage List
(3) "Short" Stub Requisition

ASSEMBLY CONTROL SECTION (D/272)

Originates
(6) Shop Parts Shortage List
(4) Purchased Parts Shortage List
(4) "Short" Stub Requisition [Copies 1-4 or 5-8]

Files
(1) Projected Assembly Schedule
(32) Shop Kit [Assembly-Until All Parts Are Available]
(32) Shop Kit [Manufacturing Requiring Purchased Materials]
(1) Purchased Parts Shortage List
(1) Stock Record Card [For Assemblies-Mach. Tool & Commercial Parts]

SHOP SCHEDULING UNIT (D/264)
(1) Shop Kit [Master Card]
(32) Shop Kit [Manufacturing and Assembly Upon Receipt of Material]

REQUISITION UNIT (D/266)
(1) "Short" Stub Requisition

MATERIAL CONTROL SECTION (D/265)
EXPEDITING SECTION (D/273)
(1) Purchased Parts Shortage List [Each]
(1) Shop Parts Shortage List [Each]

PRODUCTION STORES UNIT (D/267)
(1) Shop Kit [Green Card - Local Requisition]

PRODUCTION CONTROL DIVISION (D/260)
PLANNING BRANCH (D/261)
SCHEDULING SECTION (D/262)
PRODUCTION DISPATCHING SECTION (D/271)
(1) Shop Parts Shortage List [Each]

PROGRESS BRANCH (D/269)
(1) Purchased Parts Shortage List

ASSEMBLY DIVISION (D/230)
(2) Raw Material Substitution Order
(8) Stub Requisition [Credit]
(1) "Short" Stub Requisition [With Part]

RECEIPT CONTROL BRANCH (642)
(4) Purchased Parts Shortage List
(4) "Short" Stub Requisition

makes appropriate entries from the Purchased Parts Shortage Lists and the Shop Parts Shortage Lists. When all parts and materials are in the plant, the Shop Kits are returned to Shop scheduling. The Shop Kits have been held until all materials were available where assembly and manufacturing kits requiring purchased parts or materials are concerned.

The follow-up responsibilities are three in number. All material substitution information must be transmitted to the Assembly Division for incorporation. Purchased Parts Shortage and Shop Parts Shortage Lists are originated and disseminated to those concerned, see Chart IV-6. Finally, the shop foremen must be kept up-to-the assembly schedule if possible. The Shop Kit board is used as a scheduling indication for the Assembly Division.

Upon completion of the job order, the Shop Kit Master Card is forwarded to the Shop Scheduling Unit where it is filed.

3. Expediting Section (D/273)

In this final section of the Progress Branch, lies the co-ordinator of co-ordinators. All the troubles of procurement, production, and assembly are the responsibility of this section. Reference to Chart IV-7 will show that all received information is indicative of the production progress. When a variance appears the Expediting Section lights a fire under the slow cog and thus attempts to meet the Master Progress Schedule. A monthly report on this section's success is originated herein.

A final act at the end of each job order is the dating and initialing of the Close-Out Approval signifying that all Stub

CHART IV-7

PROGRESS BRANCH
D/269

PROGRESS BRANCH (D/269)
(1) Master Progress Schedule

PRODUCTION STORES UNIT (D/267)
(1) Close-Out Approval

PRODUCTION DISPATCHING SECTION (D/271)
(1) Shop Kit [White Card - When Job Complete]

ASSEMBLY CONTROL SECTION (D/272)
(1) Shop Parts Shortage List
(1) Purchased Parts Shortage List

EXPEDITING SECTION (D/273)

Originates
Monthly Progress Report

Files
(1) Shop Parts Shortage List
(1) Purchased Parts Shortage List
(1) Master Progress Schedule

PROGRESS BRANCH (D/269)

Monthly Progress Report
(1) Close-Out Approval

Requisitions have been completed. It is then forwarded for the approval of the Head of the Progress Branch.

This completes the duties and responsibilities of the Progress Branch as it attempts to maintain the standards of performance required of an efficient operation. While the procedures are complex, it is necessarily so in a plant that must produce the variety and number of job-lot products that are turned out of the Naval Ordance Plant, Indianapolis.

C. Recommendations See Chart IV-8

In the time allowed a thorough study of all the minute procedures was not possible. However, there were two areas in which recommendations are herein presented for consideration and possible incorportion in this and other Naval Ordnance Plants under Bureau authorization.

The first is of an organizational nature. It is simply to combine the Production Stores Unit and the Bar Stock, Impounded or Semi-Finished Stock Unit. This is recommended since the paper work required to operate the Bar Stock Unit is nearly identical with that required by the Production Stores Unit for the same function. Other than the increased space requirement, this combination would decrease personnel required in this function as well as the number of filing systems in operation. It also would centralize all activity of this nature, utilizing trained personnel more efficiently.

The second recommendation, and the most important one, is a proposed change in method of initiating material procurement. This method is being tested at the present time and has so far proven highly satisfactory and a great improvement over the old method. It is termed "Material Procurement List Method". Reference to Chart IV-8 will provide a pictorial representation of the savings in paper and clerical work involved. The magnitude of the savings is perhaps not so evident from the illustration.

The procedure is this. From the List of Drawings, Sub-Assemblies and Parts, the Production Breakdown (Worksheet) is originated. This

information is transferred to either the Material Procurement List or the End-Use Procurement List, depending on the time the items will be needed after receipt date. The End-Use Procurement List is utilized for material to be used within 30 days of receipt. The Material Procurement List is to be used for all other items. While these two forms are following the old Production Breakdown procedures, the Stock Record Cards are originated from the Production Breakdown (Worksheet) and follow their previous routing.

The advantages are as follows:

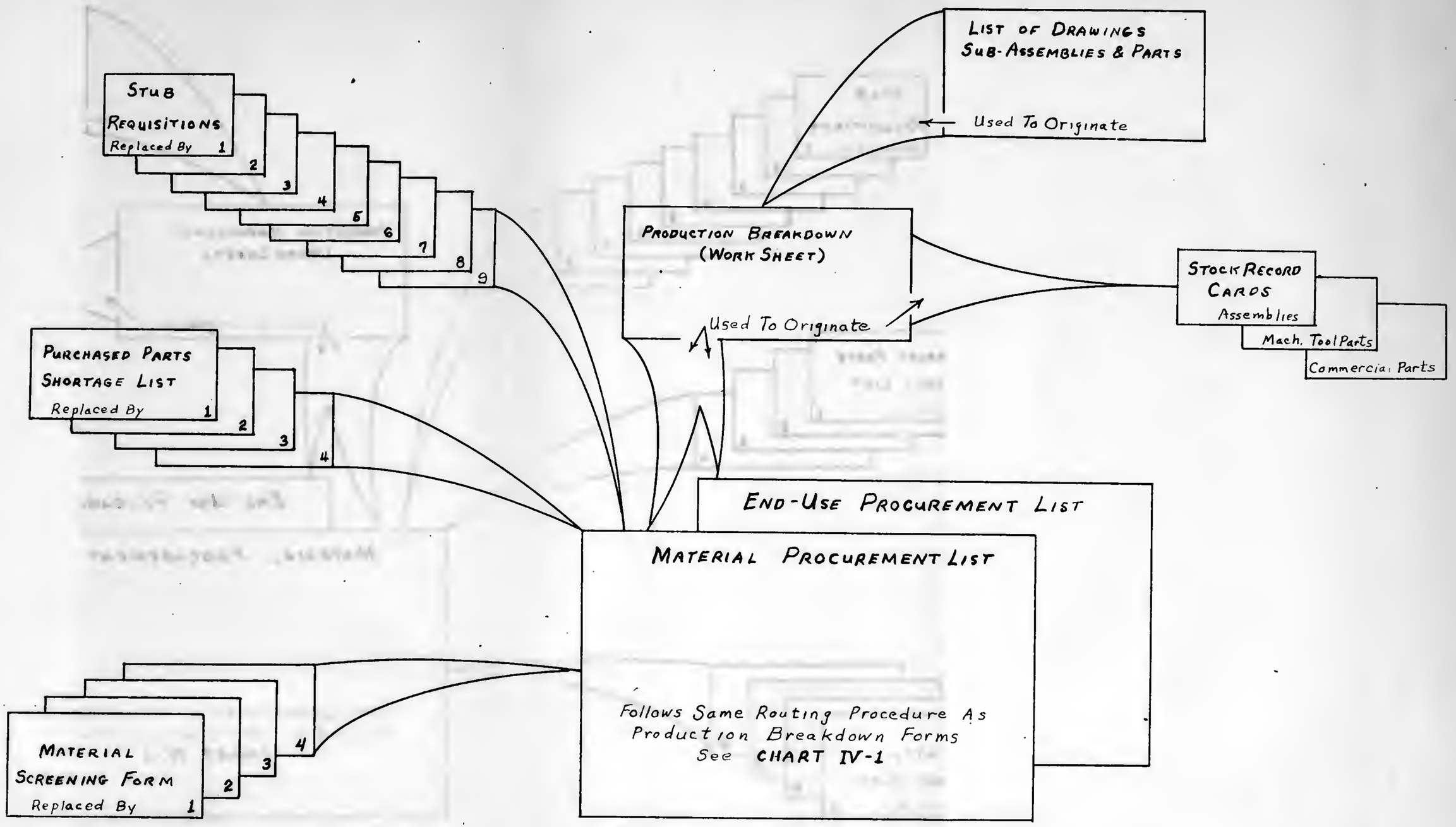
1. The new forms act as a material screening form.
2. They also act as a purchased parts shortage list.
3. The big saving is that they provide authorization for purchase of all items, thus replacing nine Stub Requisition forms for each item on the Material Procurement List or End-Use Procurement List. As an example, one Material Procurement List page could replace forty-five copies of the Stub Requisition and the typing thereof.
4. Gives status of all purchased parts and materials on one form which simplifies the delivery date problem when more than one part will be late.
5. Eliminates posting by Cost Control from the separate Stubs for procurement.

Further utility is made of these new forms in that Assembly Control can post directly to the Stock Record Cards from up-to-date copies. They are also used by Expediting Section and can be forwarded to Production Control for information upon request. This new method

is certainly one that rates careful consideration as it seems to be a considerably more efficient method and one that will streamline that area of Production Control.

CHART IV-8

NEW MATERIAL PROCUREMENT LIST METHOD



NOTE

See Recommendations Part of Report For Further Information and Routing

TERNAL SUBLEASE [illegible]

#

MPLETE ENGINEERING RELEASE

ERATION DUE COMPLETE

NAL BD & EN's

N MATERIALS

STINGS

RCHASED PARTS

E ROUTINGS

E KITS

EMBLY ROUTINGS

EMBLY KITS

E PARTS

arks:

. If for any reason your portion of the above edule cannot be met, please notify the writer ned immediately.

. When your portion of the above schedule is plated, please date, initial, and return this e to the undersigned.

J. D. Shepherd
Asst. Project Engineer
Unit

FIRM REQUIREMENT AND OBLIGATION OF MATERIAL
9ND-NOP-1985 (Formerly N-473)

DATE REQUIRED	JOB ORDER	DATE	SERIAL NUMBER

ITEM NUMBER	STOCK NUMBER	DESCRIPTION	QUANTITY REQUIRED	UNIT OF ISSUE	QUANTITY OBLIGATED				PRICE PER UNIT	
					ON HAND	ON ORDER	PROC. DOC. NUMBER	DELIVERY DATE	NSA	APA

PRODUCTION BREAKDOWN

PRODUCTION CONTRDL DIVISION

PUR. ORDER ON CASTINGS DUE	RAW MATERIAL DUE	COMPLETION OF PROCESSING DUE
ALL PURCHASE ORDERS DUE	PURCHASED PARTS DUE	SHOP PARTS DUE

NOP-157 (Rev. 3 49)

BD ITEM NO.	SHIP ITEM NO.	UNIT QUAN.	PART NUMBER	PART NAME	PROJECT ORDER QUAN.	MATERIAL SOURCE OR SPEC.	QUAN. TO PURCHASE	STUB NO.	P.O. #	VENDOR SHIP DATE	AMOUNT RECEIVED	QUANTITY TO MAKE	SHOP ORDER NUMBER	EST. HOURS	SCH. DATE	AMT. TO STORES

PROCUREMENT SOURCE

MANUFACTURED PARTS SOURCE

DATE			
P. O. NO.			
DEL. DATE			
AMOUNT			
P. R. NO.			
QTY			
S. O. NO.			
REL. DATE			
DEPT			
HOURS			
SCHEDULE			

WIP NIF GFM | J. O. ITEM NO. | UNIT PRICE

APA

NSA

STORES						ASSEMBLY			DEPT. A SCRAP - REWORK	DEPT. B SCRAP - POS. SCRAP
DATE	SOURCE	AMOUNT REC'D	ACCUM. RECEIPTS	ISSUES	STORES BAL.	AMOUNT REC'D	DATE REC'D	ACCUM. RECEIPTS		

REMARKS

STOCK RECORD CARD
FORM NO. 36050

45567

B. D. ITEM NO.	U. QTY.	PART NUMBER	NOMENCLATURE	PROJ. QTY.	RAW MAT'L	SHOP KITS	SHOP PARTS	PUR. PARTS	ASS'Y KIT	REQ. NOT FILLED

CUREMENT SOURCE																
DATE																
P. O. NO.																
DEL. DATE																
AMOUNT																

WIP	NIF	GFM	J. O. ITEM NO.	UNIT PRICE

	APA
	NSA

STORES						ASSEMBLY			DEPT. A	DEPT. E
DATE	SOURCE	AMOUNT REC'D	ACCUM. RECEIPTS	ISSUES	STORES BAL.	AMOUNT REC'D	DATE REC'D	ACCUM. RECEIPTS	SCRAP - POS. REWORK	SCRAP

NOP-4519
OPPO 9ND, GREAT LAKES, ILL.

PURCHASED PARTS SHORTAGE LIST JO. # _____

MK _____ MOD _____ QY _____

DATE _____

PREPARED BY _____

D. #	PART #	NOMENCLATURE	UNIT QTY	QTY REQ'D	SOURCE	REMARKS	FOLLOW UP INFORMATION					
							WEEK OF	WEEK OF	WEEK OF	WEEK OF	WEEK OF	WEEK OF

-NOP-4520
v--DPPO 9ND, GREAT LAKES, ILL.

SHOP PARTS * SHORTAGE LIST - JO-_____

MK _____ MOD _____ QTY. _____

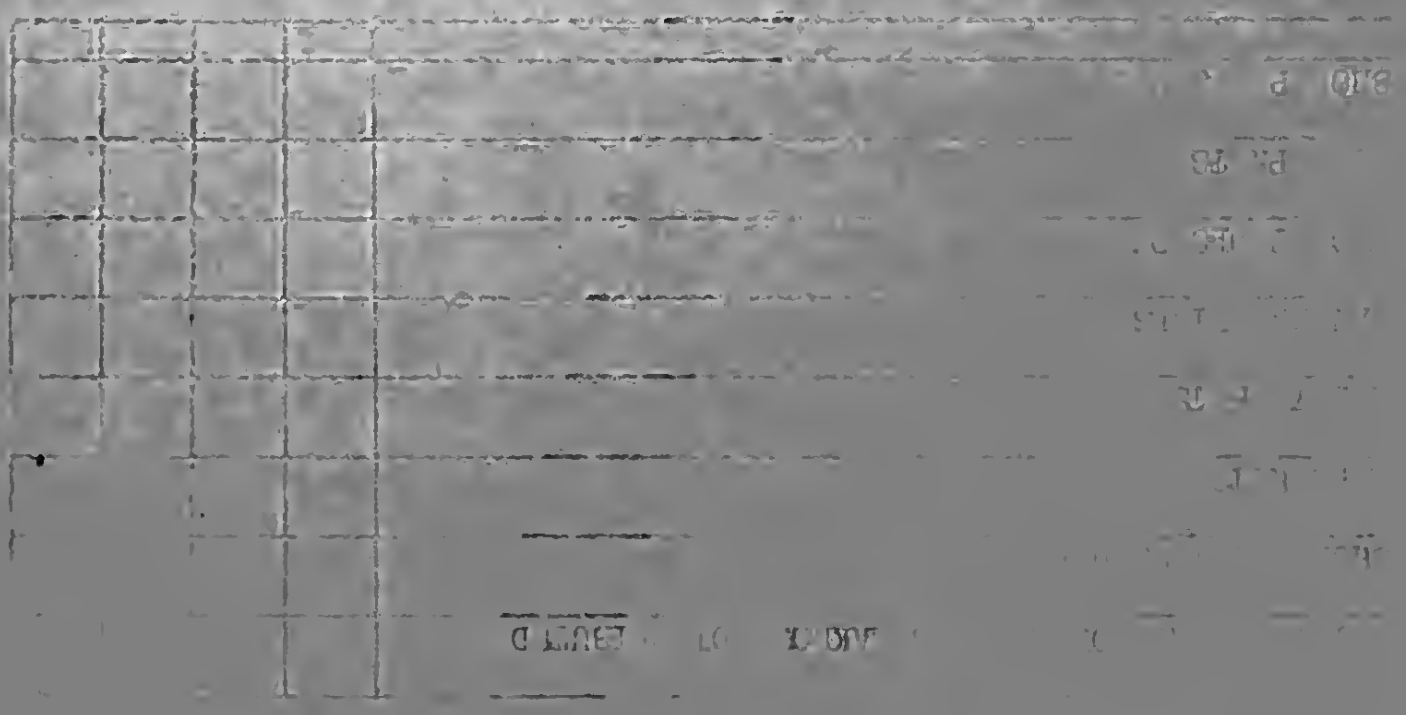
SHEET _____ OF _____

DATE _____

PREPARED BY _____

D. NO.	PART NO.	UNIT QTY.	PART NAME	ORDER NO.	AMT.	DEPT.	SCHED.	REMARKS

NOTES



ACCOUNT _____

MATERIAL PROCUREMENT LIST

STOCK NUMBER	DESCRIPTION	SPECIFICATION	QTY	UNIT ISS

(PENSE ACCOUNT _____

MATERIAL PROCUREMENT LIST

DATE RELEASED _____ LIST NO. _____ J.O. NO. _____

RELEASED _____ (SIGNATURE) PAGE ___ OF ___ PAGES _____

M EM 2	STOCK NUMBER	DESCRIPTION	SPECIFICATION	QTY.	UNIT ISS	EST. UNIT COST	EST. TOTAL COST	DELIVERY SCHEDULE REQ'D.	PUR. CONT NO.	PROCUREMENT DOC. NO.	CONTRACT DELIVERY	ACTUAL PRICE			DELIVERY INFORMATION

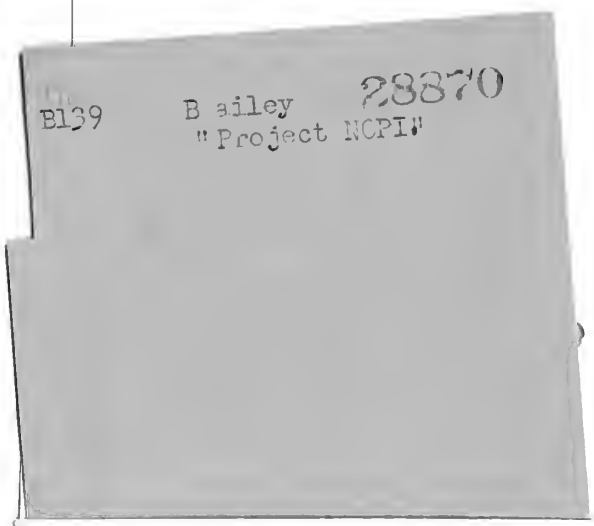
EXPENSE ACCOUNT _____

END-USE PROCUREMENT LIST

DATE RELEASED _____ J.O. NO. _____ LIST NO. _____

APPROVED _____ (SIGNATURE) PAGE ___ OF ___ PAGES ___

BM ITEM NO.	STOCK NUMBER	DESCRIPTION	SPECIFICATION	QTY.	UNIT ISS	EST. UNIT COST	EST. TOTAL COST	DELIVERY SCHEDULE REQ'D.	PUR CONT NO.	PROCUREMENT DOC. NO.	CONTRACT DELIVERY	ACTUAL PRICE			DELIVERY INFORMATION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"Project NCPI"

B139 Bailey 28870
"Project NCII."

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Project NOPI
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